Heating, Ventilation and Air Conditioning

GENERAL

SPECIFICATION EC9792A5

Item		Specification
Heater assembly	Heater Type	Air mix type
	Capacity	4,500 ± 10% kcal/hr
Evaporator	Cooling capacity	4,100 ± 10% kcal/hr
Cmpressor	Type	Swash plate (HS-15)
	Oil capacity	R140~160cc
	Pressure relief valve	Operating pressure : 35~42.2kg/cm²
	Voltage	D.C 12.8 ± 0.2V
Magnetic clutch	Voltage & wattage	D.C 12.8 ± 0.2V, Max. 54W
	Torque	Min. 4.4kg.m
Refrigerant	Capacity	R-134a (600 ± 25g)
Triple pressure switch	High pressure	ON : 32.0 ± 2.0 kg/cm² OFF : 26.0 ± 2.0 kg/cm²
	Middle pressure	ON : 18.0 ± 0.8 kg/cm² OFF : 14.0 ± 1.2 kg/cm²
	Low pressure	ON : 2.3 ± 0.25 kg/cm² OFF : 2.0 ± 0.2 kg/cm²
Thermistor	A/C ON/OFF	ON : 3.0 ± 0.6 °C OFF : 1.5 ± 0.6 °C
Heater control assembly		MANUAL Type, AUTOMATIC Type

AIR CONDITIONING SYSTEM

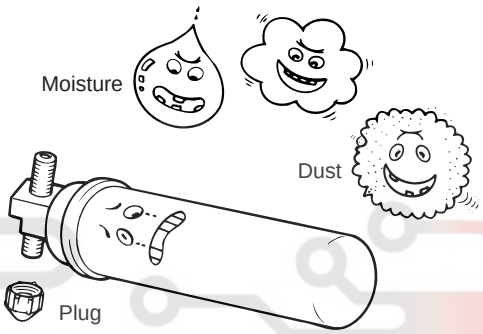
INSTRUCTIONS EDF4213E

WHEN HANDLING REFRIGERANT

1. R-134a liquid refrigerant is highly volatile. A drop on the skin of your hand could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. It is standard practice to wear goggles or glasses to protect your eyes, and gloves to protect your hands. If the refrigerant splashes into your eyes, wash them with clean water immediately.
3. The R-134a container is highly pressurized. Never leave it in a hot place, and check that the storage temperature is below 52°C (126°F).
4. An electronic leak detector should be used to check the system for refrigerant leakage. Bear in mind that the R-134a, upon coming into contact with flame, produces phosgene, a highly toxic gas.
5. Use only recommended the lubricant for R-134a systems. If lubricants other than the recommended one used, system failure may occur.
6. PAG lubricant absorbs moisture from the atmosphere at a rapid rate, therefore the following precautions must be observed :
   - When removing refrigerant components from a vehicle, cap immediately the components to prevent from the entry of moisture.
   - When installing refrigerant components to a vehicle, do not remove the cap until just before connecting the components.
   - Complete the connection of all refrigerant tubes and hoses without delay to prevent the A/C system from taking on moisture.
   - Use the recommended lubricant from a sealed container only.
7. If an accidental discharge in the system occurs, ventilate the work area before resuming service.

WHEN REPLACING PARTS ON A/C SYSTEM

1. Never open or loosen a connection before discharging the system.
2. Seal the open fittings of components with a cap or plug immediately to prevent intrusion of moisture or dust.
3. Do not remove the sealing caps from a replacement component until it is ready to be installed.
4. Before connecting an open fitting, always install a new sealing ring. Coat the fitting and seal with refrigerant oil before making the connection.



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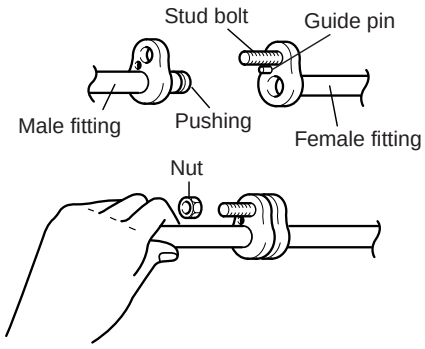
WHEN INSTALLING CONNECTING PARTS

FLANGE WITH GUIDE PIN

Check the new O-ring for damage (use only the specified) and lubricate it using compressor oil. Tighten the nut to specified torque.



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Size	Tightening torque (N.m (kg.m, lb.ft))	
	General bolt, nut	
	4T	7T
M6	5~6 (0.5~0.6, 3.6~4.3)	9~11 (0.9~1.1, 6.5~7.9)
M8	12~14 (1.2~1.4, 8.7~10)	20~26 (2.0~2.6, 14~18)
M10	25~28 (2.5~2.8, 18~20)	45~55 (4.5~5.5, 32~39)
Size	Flange bolt, nut	
	4T	7T
M6	5~7 (0.5~0.7, 3.6~5.0)	8~12 (0.8~1.2, 5.8~8.6)
M8	10~15 (1.0~1.5, 7~10)	19~28 (1.9~2.8, 14~20)
M10	21~31 (2.1~3.1, 15~22)	39~60 (3.9~6.0, 28~43)

NOTE

T means tensile intensity, which is stamped on the head of bolt only numeral.

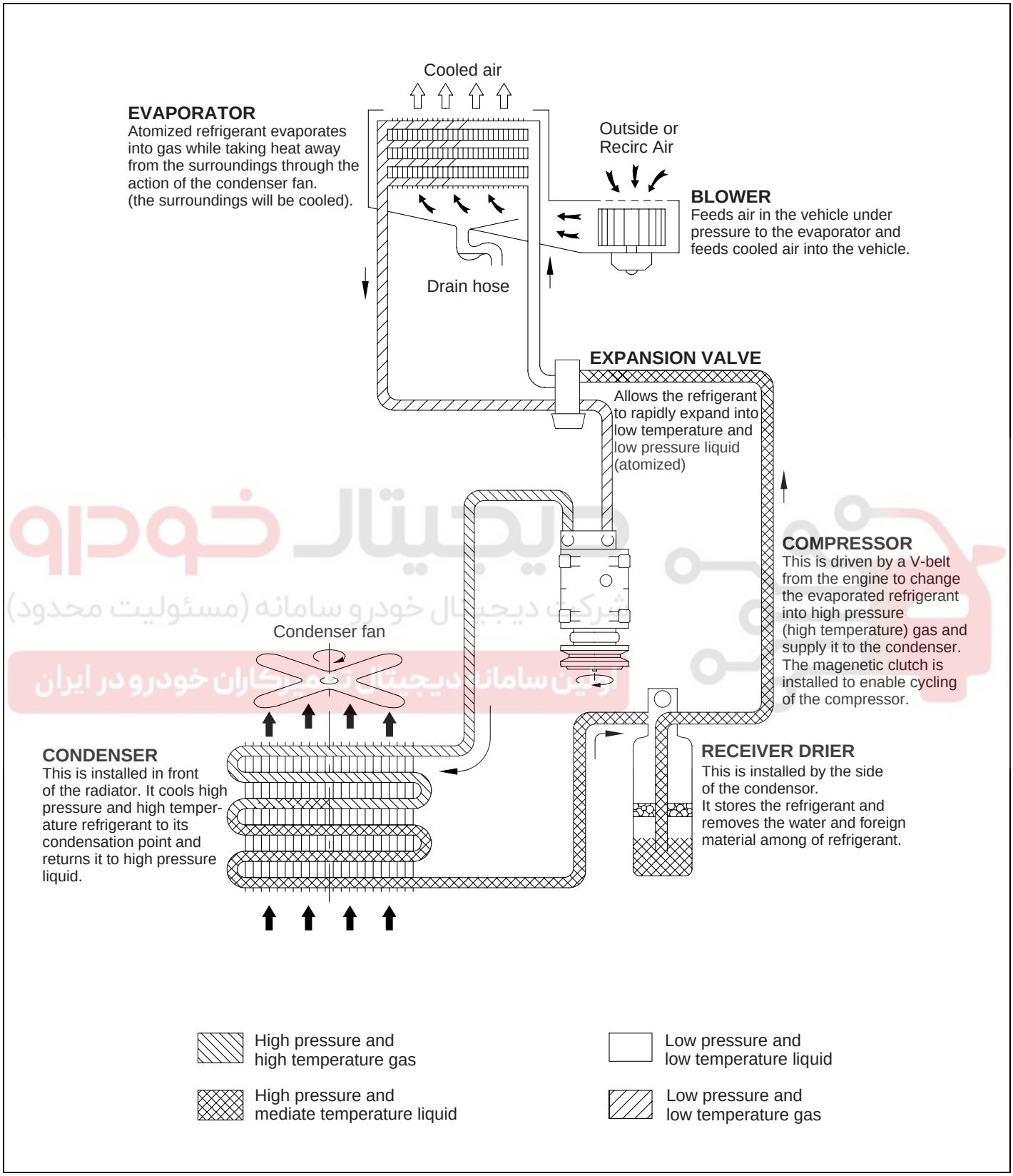
HANDLING TUBING AND FITTINGS

The internal parts of the refrigeration system will remain in a state of chemical stability as long as pure moisture-free refrigerant and refrigerant oil are used. Abnormal amounts of dirt, moisture or air can upset the chemical stability and cause problems or serious damage.

THE FOLLOWING PRECAUTIONS MUST BE OBSERVED

1. When it is necessary to open the refrigeration system, have everything you will need to service the system ready so the system will not be left open any longer than necessary.
2. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture.
3. All lines and components in parts stock should be capped or sealed until they are ready to be used.
4. Never attempt to rebind formed lines to fit. Use the correct line for the installation you are servicing.
5. All tools, including the refrigerant dispensing manifold, the gauge set manifold and test hoses, should be kept clean and dry.

REFRIGERATION CYCLE EFF7F053



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REFRIGERANT SYSTEM SERVICE BASICS ED457031

REFRIGERANT RECOVERY

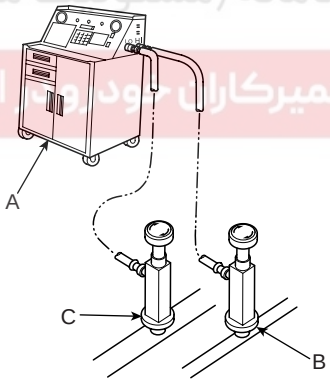
Use only service equipment that is U.L-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

CAUTION

- ***Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.***
- ***Be careful when connecting service equipment.***
- ***Do not breathe refrigerant or vapor.***

If accidental system discharge occurs, ventilate work area before resuming service.
Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect a R-134a refrigerant. Recovery/Recycling/Charging System (A) to the high-pressure service port (B) and the low-pressure service port (C) as shown, following the equipment manufacturer's instructions.



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2. Measure the amount of refrigerant oil removed from the A/C system after the recovery process is completed. Be sure to install the same amount of new refrigerant oil back into the A/C system before charging.

SYSTEM EVACUATION

Use only service equipment that is U.L-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

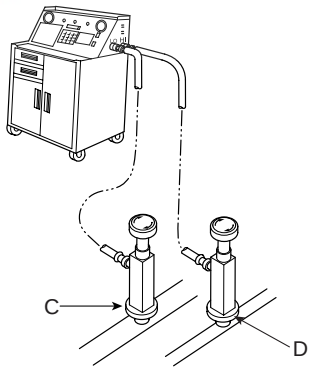
CAUTION

- ***Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.***
- ***Be careful when connecting service equipment.***
- ***Do not breathe refrigerant or vapor.***

If accidental system discharge occurs, ventilate work area before resuming service.
Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. When an A/C System has been opened to the atmosphere, such as during installation or repair, it must be evacuated using a R-134a refrigerant Recovery/Recycling/Charging System. (If the system has been open for several days, the receiver/dryer should be replaced, and the system should be evacuated for several hours.)

2. Connect a R-134a refrigerant. Recovery/Recycling/Charging System (A) to the high-pressure service port (B) and the low-pressure service port (C) as shown, following the equipment manufacturer's instructions.



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3. If the low-pressure does not reach more than 93.3 kPa (700 mmHg, 27.6 in.Hg) in 10 minutes, there is probably a leak in the system. Partially charge the system, and check for leaks (see Leak Test.)

4. Remove the low pressure valve from the low-pressure service port.

SYSTEM CHARGING

Use only service equipment that is U.L-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

CAUTION

- ***Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.***
- ***Be careful when connecting service equipment.***
- ***Do not breathe refrigerant or vapor.***

If accidental system discharge occurs, ventilate work area before resuming service.
Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect a R-134a refrigerant. Recovery/Recycling/Charging System (A) to the high-pressure service port (B) as shown, following the equipment manufacturer's instructions.

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2. Add the same amount of new refrigerant oil to system that was removed during recovery. Use only Specified refrigerant oil. Charge the system with 21.1 ± 0.88 oz. (600 ± 25g) of R-134a refrigerant. Do not overcharge the system the compressor will be damaged.

REFRIGERANT LEAK TEST E04389C6

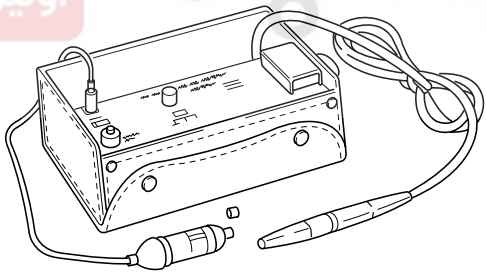
Always conduct a leak test with an electronic leak detector whenever leakage or refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening or connection fittings.

NOTE

In order to use the leak detector properly, read the manual supplied by the manufacturer.

If a gas leak is detected, proceed as follows:

1. Check the torque on the connection fittings and, if too loose, tighten to the proper torque. Check for gas leakage with a leak detector.
2. If leakage continues even after the fitting has been tightened, discharge the refrigerant from the system, disconnect the fittings, and check their seating faces for damage. Always replace, even if the damage is slight.
3. Check the compressor oil and add oil if required.
4. Charge the system and recheck for gas leaks. If no leaks are found, evacuate and charge the system again.



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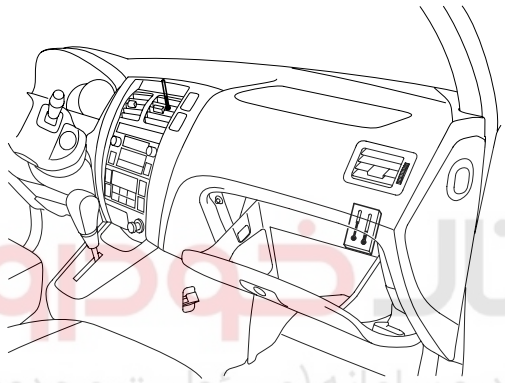
A/C SYSTEM PERFORMANCE TESTS

1. Connect a R-134a refrigerant. Recovery/Recycling/Charging System to the high-pressure service port as shown, following the equipment manufacturer's instructions.
2. Determine the relative humidity and air temperature.
3. Remove the glove box stopper and tension code and let the glove box hang down.
4. Insert a thermometer in the cool air outlet.
5. Place a thermometer near the blower unit inlet.



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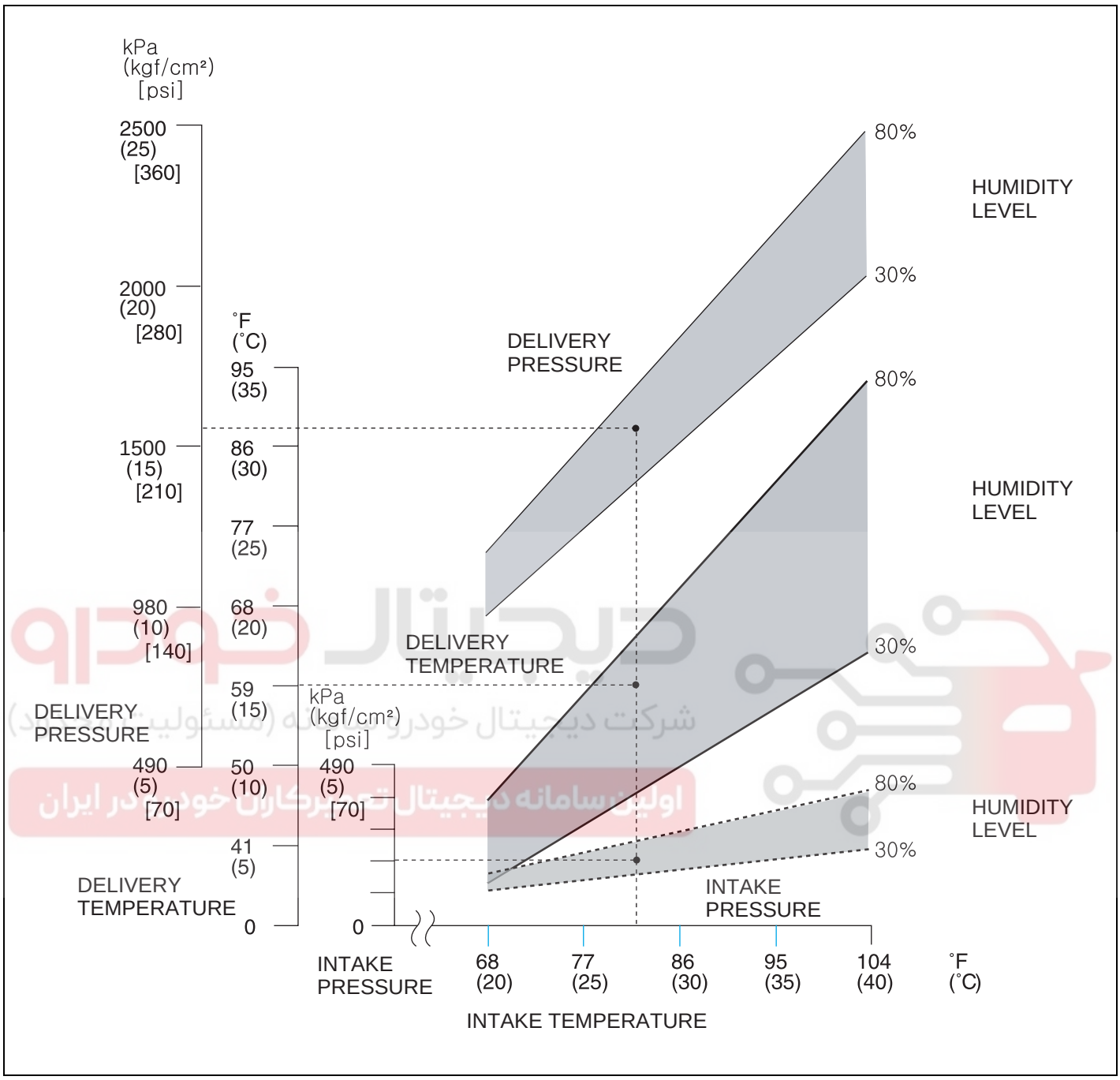
6. Test condition
   - Avoid direct sunlight.
   - Open hood.
   - Open front doors.
   - Set the temperature control dial to Max cool, the mode control switch to Vent, and the recirculation control switch to Recirculation.
   - Turn the A/C switch in and the fan switch to Max.
   - Run the engine at 1,500 rpm.
   - No driver or passenger in vehicle.
7. After running the air conditioning for 10 minutes under the above test conditions, read the delivery temperature from the thermometer in the cool air outlet, the intake temperature near the blower unit inlet, and the high and low system pressure from the A/C gauges.
8. To complete the chart
   - Mark the delivery temperature along the vertical line
   - Mark the intake temperature along the bottom line
   - Draw a line straight up from the air temperature to the humidity
   - Mark a point 10% above and 10% below the humidity level
   - From each point
   - Draw a horizontal line across the delivery temperature
   - The delivery temperature should fall between the two lines
   - Complete the low side pressure test and high side pressure test in the same way
   - Any measurements outside the line may indicate the near for more further inspection



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ON-VEHICLE INSPECTION E54804DF

This is a method in which the trouble is located by using a gauge set. Read the gauge pressure when these conditions are established.

TEST CONDITIONS

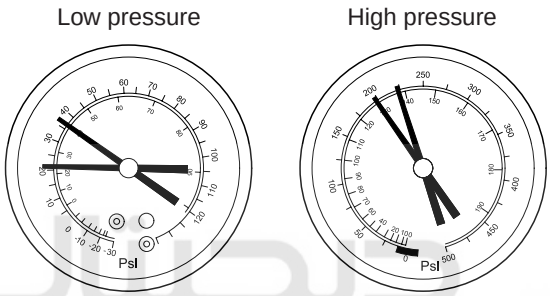
- Temperature at the air inlet with the switch set at recirculation is 30~35°C (86~95°F).
- Engine running at 1,500rpm.
- Blower speed control knob on "4" position.
- Temperature control knob on "COOL" position.

NOTE

It should be noted that the gauge indications may vary slightly due to ambient temperature conditions.

1. Normally functioning refrigeration system.
Gauge reading :

Low pressure side : 0.15~0.25MPa (1.5~2.5 kg/cm^2, 21.8~36.3psi)
High pressure side : 1.37~1.57MPa (14~16 kg/cm^2, 200~228psi)



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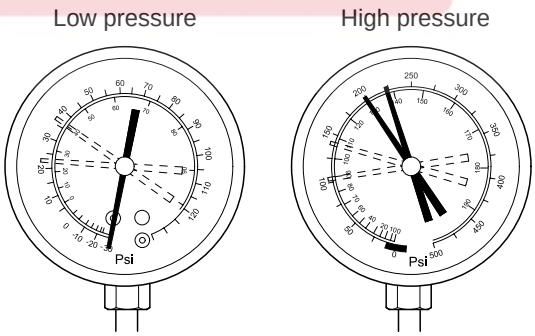
2. Moisture present in refrigeration system.

Condition : Periodically cools and then fails to cool

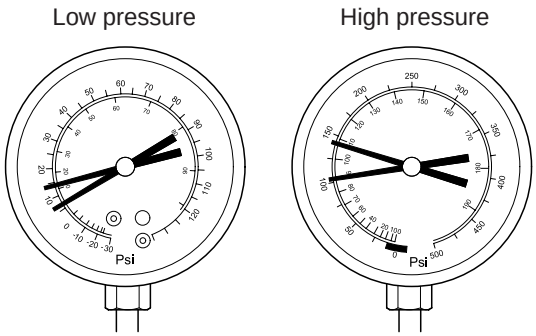


EQKE006B

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
During operation, pressure on low pressure side sometimes becomes a vacuum and sometimes normal	Moisture entered in refrigeration system freezes at expansion valve orifice and temporarily stops cycle, but normal state is restored after a time when the ice melts	- Drier in over saturated state - Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant	- Replace drier - Remove moisture in cycle through repeatedly evacuating air - Charge proper amount of new refrigerant

3. Insufficient cooling

Condition : Insufficient cooling

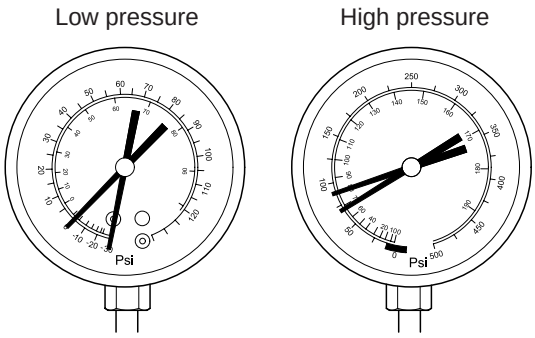


EQKE006C

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
- Pressure low on both low and high pressure sides - Insufficient cooling performance	Gas leakage at some place in refrigeration system	- Insufficient refrigerant in system - Refrigerant leaking	- Check for gas leakage with gas leak detector and repair if necessary - Charge proper amount of refrigerant - If indicated pressure value is near 0 when connected to gauge, create the vacuum after inspecting and repairing the location of the leak

4. Poor circulation of refrigerant

Condition : Insufficient cooling

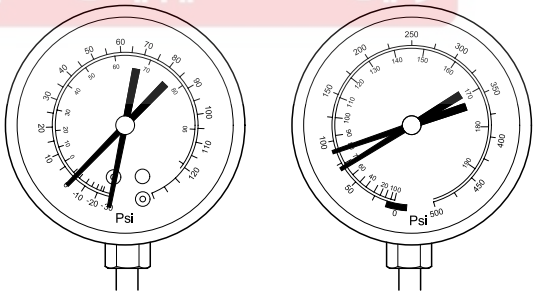


EQKE006D

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
- Pressure low in both low and high pressure sides - Frost on tube from receiver to unit	Refrigerant flow obstructed by dirt in drier	Condenser clogged	Replace drier

5. Refrigerant does not circulate

Condition : Does not cool (Cools from time to time in some cases)

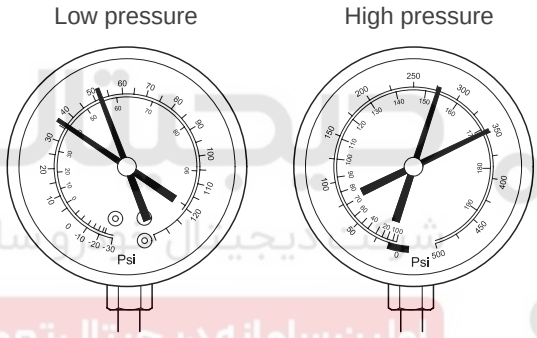


EQKE006E

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
- Vacuum indicated on low pressure side, very low pressure indicated on high pressure side - Frost or dew seen on piping before and after receiver/drier or expansion valve	- Refrigerant flow obstructed by moisture or dirt in refrigeration system - Refrigerant flow obstructed by gas leakage from expansion valve	Refrigerant does not circulate	- Check expansion valve - Clean out dirt in expansion valve by blowing with air - Replace drier - Evacuate air and charge new refrigerant to proper amount - For gas leakage from expansion valve, replace expansion valve

6. Refrigerant overcharged or insufficient cooling of condenser

Condition : Insufficient cooling

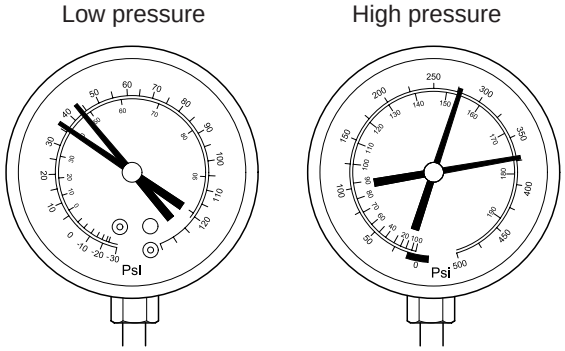


EQKE006F

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressure too high on both low and high pressure sides	- Unable to develop sufficient performance due to excessive refrigerant - Insufficient cooling of condenser	- Excessive refrigerant in cycle → refrigerant overcharged - Condenser cooling → condenser fins clogged or condenser fan faulty	- (1) Clean condenser - (2) Check cooling fan with fluid coupling operation - (3) If (1) and (2) are in normal state, check amount of refrigerantCharge proper amount of refrigerant

7. Air present in refrigeration system

Condition : Insufficient cooling

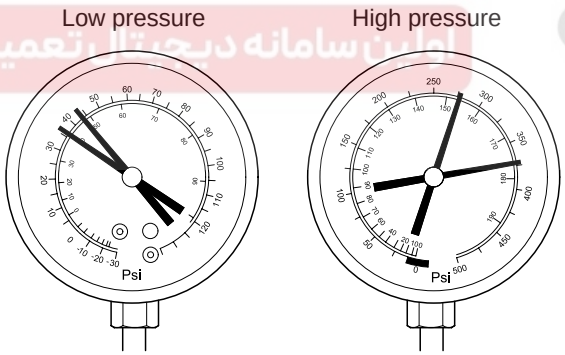


EQKE006G

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
- Pressure too high on both low and high pressure sides - The low pressure piping hot to the touch	Air entered in refrigeration system	- Air present in refrigeration system - Insufficient vacuum purging	- Check compressor oil to see if it is dirty or insufficient - Evacuate air and charge new refrigerant

8. Expansion valve functions improperly

Condition : Insufficient cooling



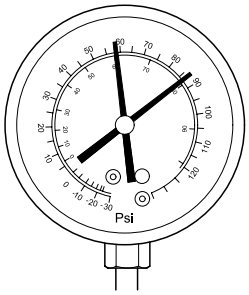
EQKE006G

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
- Pressure too high on both low and high pressure sides - Frost or large amount of dew on piping on low pressure side	Trouble in expansion valve	- Excessive refrigerant in low pressure piping - Expansion valve opened too wide	- Check expansion valve - Replace if defective

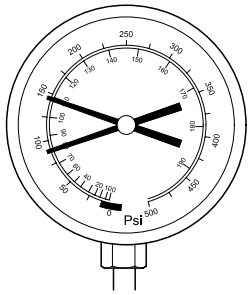
9. Defective compression compressor

Condition : Does not cool

Low pressure



High pressure



EQKE006H

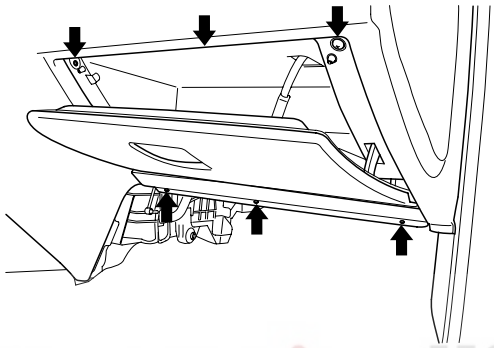
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
- Pressure too high on low and high pressure sides - Pressure too low on high pressure side	Internal leak in compressor	- Compression defective - Valve leaking or broken sliding parts	Repair or replace compressor

BLOWER CONTROLS

A/C AIR FILTER

REPLACEMENT EB02EBDE

1. Remove the glove box after loosening 6 mounting bolts.



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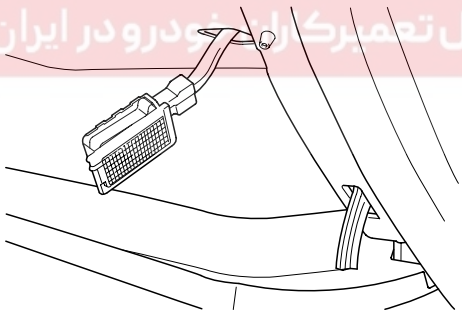
2. Disconnect the glove box lamp connector.



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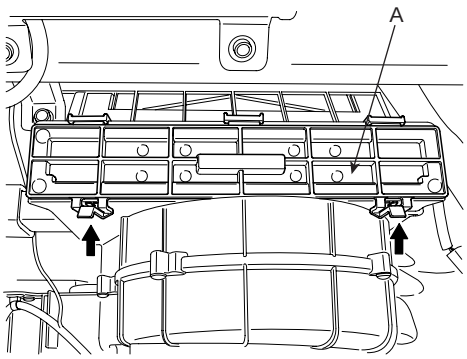
3. Remove the A/C air filter cover (A).



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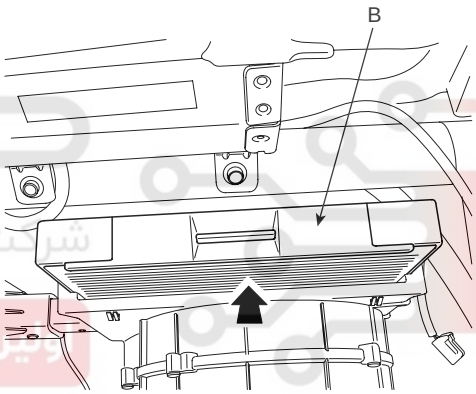
4. Replace the A/C air filter.



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5. Installation is the reverse of removal.