

The following article is designed to assist in the step by step servicing and diagnosis of air conditioning systems that use R134a as the refrigerant. It has been compiled with the assistance of Ariazone and their Automotive Air Conditioning Training Manual.

Safety precautions...

The refrigerant R 134a has a very low boiling point. Extreme care must be taken when it is being handled. Always observe the following safety precautions:

- Always wear eye protection.
- Wear gloves.
- Don't allow R134a to contact the bare skin, (as this can cause frost bite).
- Don't heat containers of R134a.
- Provide adequate ventilation when charging or recovering R143a as it is heavier than air.
- Use caution when steam cleaning around A/C components as hot water on the pipes and tubing could cause damage due to thermal expansion of the refrigerant contained within them.
- Avoid breathing R134a vapour.
- If pumping refrigerant into a cylinder, do not allow the cylinder to be filled to more than 80% of its capacity, as the remaining 20% is necessary to allow for any thermal expansion of the refrigerant.

Preparation...

The following preliminary checks should be carried out prior to any service or diagnosis of the system:

- Check for visible damage or chaffing of the hoses.
- Ensure the condenser fins are not blocked with debris such as insects, leaves, etc, and that the fins are straight.
- Ensure that the condenser fan operates and runs in the correct direction.
- Check that the engine and radiator are at the correct operating temperature and are not overheating
- Inspect the drive belts for damage and correct tension.
- Ensure that the engine viscous fan engages at the correct temperature.
- The compressor should cycle on and off.
- Make sure the evaporator drain hose is not blocked.
- The heater is turned off and in the full cold mode position.
- The air mix door is fully closed.
- A/C switch illuminates when engaged.
- There are no vacuum hose leaks.
- The dash vents should open and close fully.
- There must be no air leaks between the evaporator case and the heater case.
- The blower fan should be operational on all speeds.
- Check for any evidence of refrigerant leakage and oil staining at components and connections.

1. Evacuation and charging procedure
2. Performance testing (General).
3. Park vehicle in a shaded area. Take note of ambient temperature.
4. Close both front windows and doors.
5. Connect both high and low pressure service hose coupling valves to the system filling ports.
6. Open all dash louvres and adjust to the straight ahead position.
7. Insert thermometer probe approximately 50mm into the centre vent louvre.

Set the controls to:

- A. Recirc. air position.
- B. Maximum cooling.
- C. A/C on.
- D. Highest blower speeds

8. Start engine, bring engine speed to 1700 RPM then allow pressure gauge needles to stabilise
9. Take pressure and temperature settings. Compare these to the manufacturers performance charts found in the appropriate workshop manuals.

Note: Only take pressure and temperature readings when the compressor is engaged.

The performance test described here puts an increased demand on the A/C system. If the A/C system can operate to specification under this load, then it should have no problems maintaining a low centre vent temperature under normal driving conditions when the blower speed may be slower.