

5. What is required if retrofitting an air-conditioning system from R-12 to R-134a?

Answer Key

Testname: AHAC9SHORT16

1. Step 1- Verify the customer complaint (concern). Sometimes the customer does not understand how the system is supposed to work or does not explain the fault clearly. Verifying the fault also means that the technician can verify that the problem has been corrected after the service procedure has been performed.
Step 2- Perform a thorough visual inspection. Heating and air-conditioning problems are often found by looking carefully at all of the components, checking for obvious faults or damage due to an accident or road debris.
Step 3- Check for diagnostic trouble codes (DTCs). Many heating and air-conditioning systems use sensors and actuators, which are computer-controlled and will set diagnostic trouble codes in the event of component failure.
Step 4- Check for related technical service bulletins (TSBs). If there has been a technical service bulletin (TSB) released to solve a known problem, it saves a lot of time to know what to do rather than spend a lot of time trying to find and correct a customer concern.
Step 5- Perform an A/C performance test. An a/c performance test is used to determine how well the system is able to remove heat from inside the vehicle and move it to the outside of the vehicle.
Step 6- Determine the root cause. Perform pressure and temperature measurements to help determine the root cause of the customer concern.
Step 7- Repair the system. Replace or repair the components that are defective or are no longer working as designed and recharge the system according to factory specifications.
Step 8- Verify the repair. Drive the vehicle under similar conditions that caused the customer to complain and verify that the concern has been corrected.

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2. A visual inspection of the under hood items includes the following:
 1. Check the condition of the A/C compressor drive belt.
 2. Check the tension of the A/C compressor drive belt and the automatic tensioner.
 3. Inspect the refrigerant hoses and lines for signs of oily residue and damage. Oil residue with caked-on dirt indicates a probable leak. Check that each of the A/C service ports is capped.
 4. While checking the hoses and lines, determine if the system uses a thermal expansion valve system (TXV) or an orifice tube (OT) system and if a variable displacement compressor is used. The compressor shape and model number are used for identification.
 5. Check that the compressor mounting bolts are tight.
 6. Check to make sure that the air gap of the A/C compressor clutch is correct.
 7. Check the electrical wires to the clutch, blower motor, and any A/C switches for good, tight connections, and possible damage.
 8. Check the condition of any vacuum hoses between the intake manifold and bulkhead, if equipped.
 9. Check the faces of the condenser and radiator core for restriction to airflow caused by Debris.

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3. Diagnostic trouble codes should be retrieved before looking at the technical service bulletins because many bulletins include what DTCs may or may not be present.

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4. Temperature change across the evaporator—The temperature difference between the inlet and outlet of the evaporator should be same or within 5° (– 5° to +5°). If the temperature at the evaporator outlet is more than 6° different than the inlet temperature, then the system is overcharged.
 - Temperature change across the condenser—The temperature difference between the inlet and outlet of the condenser should be 20°F to 50°F (10°C to 30°C).
 - If the temperature difference is higher than 50°, then the system is undercharged or has a restriction.
 - If the temperature difference is less than 19°, then the system is overcharged.

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5. For a proper retrofit, this section of the Clean Air Act requires the following:
- The technician must be Section 609 certified.
 - Recover the original refrigerant using EPA-approved equipment.
 - Replace service fittings to match new refrigerant.
 - Install a new label to cover the old one.
 - Ensure that the system has barrier hoses.
 - Ensure that the system has a high-pressure shutoff switch.

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