

Top 30 HVAC Component Testing Questions

15 Cooling Component Questions + 15 Heating Component Questions

A practical technician reference focused on how to test HVAC components correctly and distinguish an actual component failure from a system condition causing the component to respond normally.

COOLING COMPONENT TESTING

1. How do I test a compressor to determine if it's good or bad?

Testing approach: Check winding resistance (C-R, C-S, R-S); test each terminal to ground; compare operating amperage to rated values; evaluate compression using system pressures; verify voltage under load.

2. How do I test a run capacitor?

Testing approach: Disconnect power and safely discharge; measure capacitance in microfarads; compare to rated capacitance and tolerance; inspect for swelling, leaking, or physical damage.

3. How do I test a contactor?

Testing approach: Verify 24 VAC across the coil during a cooling call; check line and load voltage; inspect contacts for burning or pitting; check voltage drop across closed contacts.

4. How do I test a condenser fan motor?

Testing approach: Verify supply voltage; measure amperage; test the capacitor; check winding resistance where appropriate; check motor temperature/overload; inspect bearings and fan blade.

5. How do I test an indoor blower motor?

Testing approach: Verify voltage and control signal; check amperage; test the capacitor on PSC motors; check ECM inputs/outputs as applicable; verify actual airflow.

6. How do I test a TXV?

Testing approach: Measure superheat; verify proper sensing-bulb mounting; check the equalizer line; warm/cool the sensing bulb and observe response; distinguish a restricted TXV from low charge or low airflow.

7. How do I test a fixed metering device/piston for a restriction?

Testing approach: Check superheat and subcooling; look for abnormal temperature drop across a restriction; verify piston size and orientation; inspect screens and distributor tubes.

8. How do I test a low-pressure switch?

Testing approach: Measure continuity; verify actual refrigerant pressure; compare opening/closing pressure to specifications; determine whether the switch or the system condition caused the trip.

9. How do I test a high-pressure switch?

Testing approach: Verify continuity; measure actual head pressure; check condenser airflow and coil condition; compare cutout/reset pressure with manufacturer specifications.

10. How do I test a temperature or thermistor sensor?

Testing approach: Measure resistance and actual temperature; compare resistance to the manufacturer's temperature/resistance chart; check wiring and connections.

11. How do I test a 24-volt transformer?

Testing approach: Verify primary voltage; measure secondary voltage; check transformer VA rating/load; check for shorts or excessive control-circuit current.

12. How do I test a control board?

Testing approach: Verify incoming power; verify thermostat inputs; verify expected board outputs; check fault codes; test connected loads before condemning the board.

13. How do I test a reversing valve on a heat pump?

Testing approach: Verify correct coil voltage; check coil resistance; check temperature changes across valve tubing; verify pressure change during mode change; determine electrical versus mechanical failure.

14. How do I test whether an evaporator or condenser coil has proper airflow?

Testing approach: Measure total external static pressure; measure pressure drop across components; determine actual or estimated CFM; inspect coil cleanliness; compare temperature and enthalpy changes.

15. How do I test the actual cooling capacity of an air-conditioning system?

Testing approach: Measure airflow; measure entering/leaving dry-bulb and wet-bulb temperatures; calculate enthalpy change and total BTU/h; compare measured capacity with expected equipment performance.

HEATING COMPONENT TESTING

1. How do I test a furnace igniter?

Testing approach: Verify board output voltage; measure resistance when appropriate; inspect for cracks/damage; check current where the manufacturer specifies; verify ignition-sequence timing.

2. How do I test a flame sensor?

Testing approach: Measure DC microamps in series; compare flame signal to manufacturer specifications; inspect/clean the sensor; verify grounding and polarity.

3. How do I test a furnace pressure switch?

Testing approach: Check continuity; measure inducer pressure with a manometer; compare pressure to switch rating; inspect tubing, ports, venting, and the condensate system.

4. How do I test an inducer motor?

Testing approach: Verify supply voltage; measure amperage; measure draft/negative pressure; inspect wheel and housing; check bearings and venting restrictions.

5. How do I test a furnace gas valve?

Testing approach: Verify control voltage; verify inlet gas pressure; measure manifold pressure; verify valve operation during the ignition sequence; distinguish valve failure from board/control problems.

6. How do I test a high-limit switch?

Testing approach: Check continuity; monitor furnace temperature rise; determine actual opening temperature where appropriate; verify airflow before condemning the limit.

7. How do I test a rollout switch?

Testing approach: Check continuity; determine why it opened; inspect burner operation; check venting/draft; evaluate the heat exchanger/secondary heat exchanger. Never treat repeated rollout trips as simply a bad switch.

8. How do I test the furnace blower motor?

Testing approach: Verify voltage/control signals; measure amperage; test PSC capacitor where applicable; verify ECM commands; measure airflow/static pressure.

9. How do I test an ECM blower motor/module?

Testing approach: Verify line voltage; verify low-voltage communication/commands; determine whether failure is the motor, module, board, or control signal; verify programming/setup.

10. How do I test a furnace control board?

Testing approach: Verify line and control voltage; follow the sequence of operation; check thermostat inputs; check outputs to the inducer, igniter, gas valve, and blower; interpret diagnostic codes.

11. How do I test a furnace transformer?

Testing approach: Measure primary voltage; measure secondary voltage; check VA load; check the low-voltage circuit for shorts; inspect fuse protection.

12. How do I test a heat exchanger?

Testing approach: Perform visual inspection; use combustion analysis; observe combustion changes when the blower starts; evaluate pressure effects where applicable; follow manufacturer-approved inspection procedures.

13. How do I test furnace gas pressure and input?

Testing approach: Measure inlet and manifold pressure; clock the gas meter when applicable; verify orifice size; compare calculated input to the furnace nameplate.

14. How do I test furnace combustion?

Testing approach: Measure O₂/CO₂ and CO; measure flue temperature; calculate combustion efficiency; evaluate excess air; compare readings throughout the heating cycle.

15. How do I test whether a furnace is delivering its rated heating capacity?

Testing approach: Verify gas input; measure airflow and temperature rise; calculate approximate delivered sensible capacity using $\text{BTU/h} = 1.08 \times \text{CFM} \times \text{Delta-T}$; account for measurement uncertainty and compare with rated/output performance.

CORE TESTING PRINCIPLE

Do not ask only, "Is the component working?" Ask whether the component is receiving the correct input, producing the correct output, and operating under the correct system conditions.

A pressure switch that will not close is not automatically defective. High superheat does not automatically mean a failed TXV. An open limit does not automatically mean a bad limit. Missing board output does not automatically mean a failed control board.

The technician's goal: separate a failed component from a component responding correctly to an abnormal system condition before replacing parts.

Safety note: HVAC testing can involve hazardous electrical voltage, pressurized refrigerant, combustible gas, hot surfaces, and combustion products. Follow manufacturer procedures, applicable codes, and proper lockout/tagout and testing practices.