Capacitor vs Compressor: How to Tell at 2 a.m.

Two failures sound similar at 2 a.m. One is a 30-minute fix. The other is a $2,000+ replacement. Here's how to tell which one you're dealing with -- before the tech rolls up.

WHO IT IS FOR

Anyone in the Birmingham east corridor staring at a dead AC at 2 a.m. trying to figure out how bad this is going to be.

WHAT IS INSIDE

The sound-by-sound comparison, the behavior tells, the visual confirmation, what a fair service call should cover, and how often each failure actually happens in Birmingham.

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Why this matters

The capacitor and the compressor sit a few inches apart in the outdoor unit cabinet. They're electrically tied together. When the capacitor fails, the compressor can't start. That makes a capacitor failure LOOK like a compressor failure to anyone who isn't a tech. Knowing the tells helps you make the right call when the tech says "your compressor is shot" -- sometimes they're right, sometimes they're lazy.

The two parts in plain English

Quick anatomy:

* Compressor -- the heart of the AC. It pumps refrigerant through the system. Big, heavy, sealed unit. $1,500-$3,500 to replace including labor. 15-20 year design life
* Dual-run capacitor -- a battery-like component that gives the compressor and outdoor fan motor a kick to start each cycle. Small, cheap. $250-$400 to replace including service call. 5-10 year life
* Capacitor failures are roughly 8x more common than compressor failures in Birmingham

Sound -- capacitor failure

You hear:

* Loud humming or buzzing from the outdoor unit -- for 5-15 seconds
* No fan starting
* Then silence or a click as the internal thermal overload trips
* Then nothing -- the unit attempts a restart every few minutes and repeats
* Indoor blower may still be running normally

Sound -- compressor failure

You hear:

* Very brief hum, maybe a click, then nothing
* OR -- loud mechanical clattering, banging, or grinding from the outdoor unit
* OR -- outdoor fan running normally but no rise in temperature differential indoors
* Hard locked compressor -- short hum, breaker trips immediately
* Burned, oily, or sharp electrical smell at the outdoor unit (lock-up or short)

Behavior tells -- capacitor

* System tries again every 3-5 minutes
* Outdoor fan may start but compressor doesn't -- partial capacitor failure (the fan side of the dual-run is still working, compressor side isn't)
* Indoor blower runs normally
* No burning smell
* System worked normally yesterday, dead today

Behavior tells -- compressor

* Breaker keeps tripping when the unit attempts to start
* Outdoor unit makes a banging or knocking sound and then is silent
* Indoor air is room temperature even with the system "running"
* System has been showing decline for weeks -- slow cooling, longer runtime
* Burning smell, oil residue on the ground near the outdoor unit, electrical odor

Visual confirmation -- capacitor

Capacitor failure has a tell that's visible if a tech opens the cabinet. The capacitor is a cylinder, usually 2-3 inches tall, sitting near the contactor in the outdoor unit. A failed capacitor will be:

* Visibly bulged on top (the dome has popped up)
* Leaking oily residue down the sides
* Discolored or melted around the terminals
* A homeowner does NOT open the cabinet under any circumstance -- capacitors hold 370V even with the unit off

Visual confirmation -- compressor

Compressor failure tells:

* Oily residue on the ground around the unit base (refrigerant + oil leak)
* Burned smell coming from the cabinet
* Loud "thunk" from inside the cabinet when the unit tried to start
* Unit is 12+ years old
* Multiple refrigerant top-offs in the last 24 months (slow leak that finally finished the compressor)

What a fair service call should cover

When the tech arrives, expect:

* Power-off and lock-out of the disconnect
* Cabinet removed, capacitor visually inspected
* Capacitance measured with a multimeter -- failing capacitors test below the labeled MFD rating
* If capacitor is the failure -- replacement with same MFD rating (or properly-sized substitute), system tested
* If compressor is suspected -- refrigerant pressure measurement, amp draw test under load, motor winding resistance test before any replacement quote
* A tech who says "compressor is shot" without performing those tests is jumping to a conclusion. Ask for the measurements

Birmingham field reality

In 25 years of working Birmingham summer service calls, the breakdown is approximately:

* Capacitor failures -- 35-40% of emergency cool-loss calls
* Contactor failures -- 15-20%
* Refrigerant leaks -- 15-20%
* Drain pan / float switch issues -- 10-12%
* Compressor failures -- 5-8%
* Other (fan motors, control boards, electrical) -- balance
* When you hear "compressor is bad" without measurements, you're probably hearing a guess

If the capacitor is the problem

Capacitor swaps are short, cheap, and reliable. A tech with the part on the truck can be in and out in 30-45 minutes. The system runs normally afterward. Recommend the tech checks the contactor at the same time -- they wear together.

If the compressor is genuinely the problem

This is a longer conversation. Key factors:

* Age of the unit (under 10 years = repair if affordable, over 13 years = replace)
* Refrigerant type (R-22 = replace, R-410A = analyze, R-454B = repair if early life)
* Whether the rest of the system is healthy or if other failures are imminent
* Manufacturer warranty status (10-12 year compressor warranties common; verify)

Sources

* ACCA Quality Installation Standard 5
* AHRI -- Equipment Specifications
* EPA Section 608 -- Technician requirements
* Manufacturer service literature (Trane, Carrier, Goodman, Rheem)
* NIST -- Capacitor testing and behavior data

Disclaimer

This guide is informational. It is not a substitute for licensed HVAC inspection, diagnosis, or service. Conditions vary by home and equipment. Refrigerant work, gas-line work, and high-voltage electrical work require an EPA Section 608 certified technician and a licensed HVAC contractor under Alabama law. When in doubt, call.

No pricing on this site is a quote. No response time is a guarantee. All ranges shown are observed market data, not promises.

About the author

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John has been turning wrenches on Birmingham HVAC systems for 25 years. Alabama HVAC contractor licensed, bonded, and insured. EPA Section 608 Universal certified. He has walked roofs, attics, crawlspaces, and condenser pads across every neighborhood in this metro and has written every guide on this site from the working tech's perspective -- not the salesman's.

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