

CR2032 vs CR2025 vs CR2016: Which Coin Cell Size for Your Battery Research?

A complete comparison of CR2032, CR2025, and CR2016 coin cell sizes for research applications: dimensional specs, capacity differences, impedance characteristics, and how to choose the right size for your electrochemical testing.

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Why Coin Cell Size Matters in Battery Research

When you are setting up an electrochemical test, the coin cell hardware you choose is not just a mechanical housing — it directly affects your electrode area, electrolyte volume, internal resistance, and ultimately the reliability of your cycling data. The three most common sizes in research labs are **CR2032** (20 mm diameter, 3.2 mm height), **CR2025** (20 mm diameter, 2.5 mm height), and **CR2016** (20 mm diameter, 1.6 mm height).

All three share the same 20 mm diameter, which means your electrode punching die stays the same. The difference is in **height** — and that seemingly small variation cascades into real trade-offs in how much active material you can load, how much electrolyte fits, and whether your separator stays properly wetted under compression.

This guide walks through the specs, performance differences, and decision logic so you can pick the right size before you punch your first electrode.

Dimensional Specs and Internal Volume

Here is the side-by-side comparison:

Specification	CR2032	CR2025	CR2016
Diameter	20 mm	20 mm	20 mm
Height	3.2 mm	2.5 mm	1.6 mm
Internal cavity depth	~2.8 mm	~2.1 mm	~1.2 mm
Usable electrode diameter	15–16 mm	15–16 mm	15–16 mm
Typical stack height	2.0–2.5 mm	1.5–2.0 mm	0.8–1.2 mm
Electrolyte volume (typical)	80–120 µL	50–80 µL	30–50 µL
Weight (304 SS case)	~3.2 g	~2.8 g	~2.2 g

The **internal cavity depth** is the usable space after accounting for the gasket, wave spring, and case thickness. This is what you have for your electrode stack (cathode + separator + anode + spacer).

The **CR2032** offers the most room, which is why it has become the de facto standard for half-cell and full-cell research. The **CR2016**, on the other hand, leaves very little margin — your stack must be thin and tightly controlled, or you risk crushing the separator during crimping.

Capacity and Active Material Loading

The height difference directly translates into how much active material you can load and how much capacity your cell can deliver.

CR2032: The Workhorse

With ~2.8 mm of internal depth, a typical CR2032 stack might look like this:

- Cathode (with aluminum foil current collector): 0.6–0.8 mm
- Separator (Celgard 2325 or equivalent): 0.025 mm
- Anode (lithium foil or graphite): 0.3–0.5 mm
- Spacer (stainless steel disc): 0.5–1.0 mm
- Wave spring: 0.3–0.5 mm

You have enough room to accommodate thick electrodes (high loading) or add multiple separator layers for safety testing. A typical research-grade CR2032 cell with NMC cathode and graphite anode can deliver **5–8 mAh** of capacity, depending on electrode loading.

The larger electrolyte volume (80–120 μL) also means better wetting, lower risk of dry-out during extended cycling, and more forgiving assembly tolerances.

CR2025: The Middle Ground

The CR2025 reduces the internal depth to ~2.1 mm. You can still fit a standard electrode stack, but with less margin:

- Thinner electrodes (lower loading)
- Less electrolyte (50–80 μL)
- Tighter crimping pressure required to ensure good contact

Typical capacity: **3–5 mAh** for the same chemistry. This size is useful when you want to test thinner electrodes (closer to commercial pouch cell specs) or when you need to save on expensive active materials during screening tests.

CR2016: The Compact Option

With only ~1.2 mm of internal depth, the CR2016 is challenging to assemble. Your electrode stack must be:

- Very thin cathode (<0.5 mm)
- Single-layer separator (no safety margin)

- Thin lithium foil or ultra-thin graphite anode
- Minimal spacer

Typical capacity: **1–3 mAh**. The small electrolyte volume (30–50 μL) means you need to be precise with your micropipette — too little and the separator dries out; too much and it leaks during crimping.

The CR2016 is rarely used in academic research unless you are specifically testing thin-film electrodes or need to fit the cell into a confined characterization setup (e.g., in-situ XRD holders with tight thickness limits).

Internal Resistance and Impedance

The physical dimensions also affect the cell's internal resistance, which shows up in your EIS spectra and rate capability tests.

Contact Resistance

All three sizes use the same 20 mm diameter, so the electrode-to-current-collector contact area is comparable. However, the **crimping pressure** differs:

- **CR2032**: Lower pressure (more internal volume to compress), which can lead to slightly higher contact resistance if crimped too loosely. Most coin cell crimpers are calibrated for CR2032, so this is rarely an issue.
- **CR2025**: Moderate pressure. Good balance between contact and risk of separator damage.
- **CR2016**: High pressure required to compress the thin stack. Risk of over-crimping and shorting if not careful.

In practice, a well-assembled CR2032 cell typically shows **1–3 Ω** of total impedance (at 1 kHz), while a CR2016 might show **2–5 Ω** due to tighter tolerances and reduced electrolyte pathways.

Electrolyte Resistance

The thicker CR2032 allows more electrolyte, which improves ionic conductivity. The CR2016's thin profile restricts electrolyte distribution, especially at high current densities. If you are testing rate capability (2C, 5C, 10C), the CR2032 will outperform simply because it has more electrolyte buffer.

When to Use Each Size

Choose CR2032 if:

- ☒ You are doing standard Li-ion or Na-ion half-cell / full-cell research
- ☒ You need high capacity (>5 mAh) for long-term cycling
- ☒ Your electrodes are thick (high loading) or you are testing new active materials with unknown swelling behavior
- ☒ You want forgiving assembly tolerances (good for training new lab members)

- ☒ You are testing high-rate performance (rate capability, pulse discharge)

Most research labs default to CR2032 for good reason — it offers the best balance of capacity, ease of assembly, and compatibility with standard crimping tools.

Choose CR2025 if:

- ☒ You are testing thin electrodes (commercial-like loading)
- ☒ You want to save on expensive active materials during initial screening
- ☒ Your characterization setup prefers a slightly lower profile (e.g., some in-situ XRD holders)
- ☒ You are okay with tighter assembly tolerances

Choose CR2016 if:

- ☒ You are testing ultra-thin film electrodes ($<50\text{ }\mu\text{m}$)
- ☒ Your in-situ characterization tool (XRD, neutron diffraction) has strict thickness limits
- ☒ You are doing proof-of-concept tests and only need 1–2 mAh capacity
- ☒ You have experience with coin cell assembly and can handle tight tolerances

Warning: The CR2016 is unforgiving. A 0.1 mm error in stack height can mean the difference between a working cell and a short circuit. If you are new to coin cell assembly, start with CR2032.

Hardware Quality: Not All Coin Cell Cases Are Equal

Regardless of which size you choose, the **material quality** and **machining precision** of the coin cell hardware matter as much as the size itself.

What to Look For

1. 304 Stainless Steel (not plated steel)

Plated steel cases are common in consumer batteries but corrode quickly in research environments (especially with organic electrolytes or long-term cycling). 304 SS offers better corrosion resistance and dimensional stability.

2. Integrated Gasket Design

The gasket (usually PTFE or PP) should be pre-installed and bonded to the case. Loose gaskets shift during crimping, leading to leaks or shorts.

3. Consistent Wall Thickness

Cheap cases have variable wall thickness ($\pm 0.1\text{ mm}$), which throws off your crimping pressure. High-quality cases hold $\pm 0.02\text{ mm}$ tolerance.

4. Matched Wave Spring Compression

The wave spring inside the case applies pressure to the electrode stack. If the spring is too weak, you get poor contact; too stiff, and you crush the separator. The spring should be matched to the case height.

Common Failure Modes

- **Leaks after crimping:** Usually caused by misaligned gasket or over-filling electrolyte. CR2016 is especially prone to this due to tight tolerances.
- **High impedance ($> 10\ \Omega$):** Often a sign of poor crimping pressure or corroded case. Check your crimper calibration.
- **Short circuit (OCV = 0 V):** Separator puncture during crimping, or metal particles in the glove box. CR2016 is more susceptible due to high compression.

If you are seeing $>20\%$ failure rate in your coin cell assembly, the hardware quality is usually the culprit, not your assembly technique.

Conclusion: CR2032 for Most Applications

For the majority of battery research applications — whether you are testing new cathode materials, optimizing electrolyte formulations, or running long-term cycling tests — **CR2032 is the right choice**. It offers:

-  Generous internal volume for thick electrodes and ample electrolyte
-  Forgiving assembly tolerances (lower failure rate)
-  Better rate capability due to larger electrolyte reservoir
-  Compatibility with standard lab crimpers and tooling

The **CR2025** is a good middle-ground option if you need to test thinner electrodes or save on materials, but it requires more careful assembly.

The **CR2016** is a niche size — only use it if your characterization setup demands a thin profile, and be prepared for tighter tolerances and higher failure rates.

Ready to Get Started?

If you are setting up coin cell testing in your lab, make sure you are using research-grade hardware with proper dimensional tolerances and corrosion resistance. Our [CR2032 Coin Cell Assembly Kit](#) includes 304 stainless steel cases with integrated gaskets, matched wave springs, and spacers — everything you need for reproducible results.

 [View CR2032 Hardware Specifications](#)

 [Download Assembly Guide \(PDF\)](#)

Have questions about coin cell assembly or hardware selection? [Contact our technical team](#) — we are here to help.

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