

CR2032 Coin Cell Assembly Guide for Research Labs

A complete guide to assembling research-grade CR2032 coin cells: component functions, correct stack order, crimping technique, and how to diagnose common failure modes.

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What Makes a Research-Grade CR2032 Different

When you are testing a new cathode material or electrolyte additive, the last thing you want is a coin cell that leaks or crimps unevenly—because you will not know whether your data reflects the chemistry or the hardware. Research-grade CR2032 hardware is built to tighter tolerances than the commodity cells used in watches and calculators, and the difference shows up in reproducibility.

This guide covers everything you need to assemble CR2032 coin cells reliably: what each component does, how to stack them correctly, common failure modes and how to avoid them, and what to look for when choosing hardware.

CR2032 Kit Components

A complete CR2032 assembly kit includes four parts.

Positive case (positive can) The shallow cup that forms the bottom of the cell. The electrode stack sits inside it. In a standard CR2032, this is the larger-diameter piece with the open end facing up during assembly.

Negative case (negative cap) The lid that crimps over the positive case to seal the cell. The negative case in this kit has an **integrated sealing ring**—a polypropylene gasket that is factory-molded directly into the rim of the case, not a separate loose component. This design eliminates one assembly variable: the gasket cannot be installed off-center, forgotten, or dislodged during handling. It also means you cannot accidentally omit it in a high-throughput assembly session.

Spacer (washer) A flat disc that sits above the electrode stack. Its job is to take up vertical space and maintain uniform compression across the electrode faces. Thickness is matched to the case depth; using the wrong spacer thickness changes the internal pressure and leads to inconsistent cycling results—a common and underappreciated source of cell-to-cell variation.

Spring A wave spring placed between the spacer and the negative case. It maintains contact pressure as the electrodes expand and contract during cycling. Without spring pressure, contact resistance rises, particularly in the first few cycles when the SEI is still forming.

All four components are **304 stainless steel**—the same grade used in medical instruments and food-grade processing equipment. 304 SS offers good corrosion resistance against most organic electrolytes and is

compatible with both carbonate-based (LiPF_6) and ether-based (LiTFSI , LiFSI) systems. For highly corrosive electrolytes such as high-concentration lithium polysulfide in Li-S cells, 316L offers marginally better chemical resistance due to its molybdenum content. For standard Li-ion, LFP, and NMC research, 304 is the correct and widely used choice.

Standard CR2032 Dimensions

Parameter	Value
Outer diameter	20.0 mm
Nominal thickness	3.2 mm
Case material	304 stainless steel
Sealing ring	Integrated PP gasket in negative case
Compatibility	All standard CR2032 crimping tools

Assembly Environment

Coin cells must be assembled in a controlled-humidity environment. The requirements depend on your electrolyte system:

Electrolyte system	Environment
Standard Li-ion (LiPF_6 in carbonate)	Dry room or glove box, < 1% RH
LFP or LMO (less moisture-sensitive)	Dry room, < 10% RH acceptable
Metallic lithium anode	Glove box, argon atmosphere
Aqueous electrolyte	Ambient acceptable

Most university labs use a glove box purged with argon or nitrogen. The primary contaminant to exclude is moisture—which reacts with LiPF_6 to produce HF—not necessarily oxygen itself. If your glove box water level reads above 5 ppm, dry your electrodes and electrolyte before assembling.

Assembly Stack Order

Place components from bottom to top in this order:

1. **Positive case** — open side up, placed on the lower die of the crimping tool
2. **Cathode electrode** — active material face up; recommended diameter 14–15 mm for CR2032
3. **Separator** — e.g., Celgard 2400 or glass fiber GF/D; recommended diameter 16–17 mm, pre-soaked with electrolyte
4. **Anode electrode** — active material face down

5. **Spacer** — flat washer, seated flat
6. **Spring** — wave spring on top of spacer
7. **Negative case** — integrated gasket rim facing down, closing the cell

A critical detail at step 7: the integrated gasket on the negative case must seat cleanly inside the rim of the positive case before crimping. If the negative case is placed off-center, the seal line will be uneven and the cell may leak at the crimp. Hold the negative case perpendicular to the positive case and let it drop straight down before applying pressure.

Electrolyte Volume

Add electrolyte to the separator after placing it on the cathode. The amount depends on electrode size and separator thickness, but a standard starting point for CR2032 is **60–80 μL** . Excess electrolyte is one of the most common assembly mistakes—it does not improve capacity or cycle life, and it makes the cell harder to crimp cleanly because liquid is displaced outward at the seal line.

For solid-state or semi-solid electrolytes, follow the specific protocol for your system; the above applies to liquid electrolytes only.

Crimping

Use a coin cell crimper set to the correct closing height for CR2032, typically **3.0–3.2 mm final height** depending on your electrode stack thickness. Key points:

- Apply pressure smoothly and continuously. Jerky or repeated partial crimps create uneven seal lines.
- After crimping, inspect the gasket ring around the circumference. A uniform, slightly compressed grey ring on the outside of the crimp indicates a good seal.
- If you see white polymer extruding from the crimp line, the closing height is set too low. Adjust upward by 0.1 mm increments.
- Wipe the exterior of each cell immediately after crimping to remove any electrolyte residue before it dries.

Post-Assembly Verification

Rest period: Let the assembled cell rest for 30–60 minutes before connecting to a cycler. For solid-state cells or thick separators with poor wetting kinetics, extend to 2–4 hours.

Open-circuit voltage (OCV): Measure OCV after the rest period. Expected values depend on the electrode chemistry:

- For a pre-lithiated graphite anode against NMC cathode: ~3.7–3.9 V (depending on lithiation state)
- For a lithium metal anode: OCV reflects the cathode potential directly
- An OCV near 0 V almost always indicates an internal short circuit caused by separator misalignment or a tear

Internal resistance (optional): Measure AC impedance at 1 kHz using an LCR meter or impedance analyzer. Freshly assembled cells at room temperature should read below 10–30 Ω depending on electrode loading and electrolyte. Values consistently above 100 Ω suggest poor electrolyte wetting, insufficient electrolyte volume, or a contact issue at the spring.

Common Failure Modes and Solutions

Symptom	Most likely cause	Corrective action
OCV $\approx$ 0 V	Internal short (separator misaligned or torn)	Discard cell; reassemble with 1 mm larger separator diameter
OCV lower than expected	Incomplete electrolyte wetting	Extend rest period to 2 hours; check electrolyte volume
Electrolyte leak at crimp	Over-filled, or closing height too high	Reduce electrolyte to 60 μ L; verify crimper setting
Low first-cycle Coulombic efficiency	Moisture contamination	Check glove box water level; pre-dry electrodes at 80–120°C
Cell swells after cycling	Gas generation from electrolyte decomposition	Check voltage limits; verify electrolyte purity and storage conditions
High impedance after assembly	Poor spring contact or dry separator	Check spring orientation; verify electrolyte volume

Pack Size and Ordering

Each pack contains **100 complete sets**: 100 positive cases, 100 negative cases with integrated sealing ring, 100 spacers, and 100 springs. For early-stage material screening where you are running multiple electrode compositions in parallel, 100 sets typically covers several weeks of work at a typical academic lab pace.

For bulk orders of 1,000 sets or more, pricing is available on request.

Related Products

- [CR2025 Coin Cell Kit](#) — smaller format for thinner electrode stacks
- [Battery Tab Kit](#) — aluminum and nickel tabs for pouch cell assembly
- [Aluminum Laminated Film](#) — pouch cell packaging material
- [Nickel Foam](#) — electrode substrate for supercapacitor and battery research

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