BATTERIES GUIDE

Battery Sizing Basics: Ah, C-Rates and Runtime Explained

Amp-hours, C-rates and depth of discharge in plain language, with a simple method to size a battery for your load.

ATB Power · Battery Solutions · 6 min read

Sizing a battery comes down to a few numbers. Get these right and you avoid both under-sizing (short runtime, early failure) and over-paying for capacity you never use.

The key terms

- **Capacity (Ah):** amp-hours the battery can deliver at a stated rate, usually the 20-hour rate (C20).
- **Energy (kWh):** capacity times voltage. A 24 V, 100 Ah battery holds about 2.4 kWh.
- **C-rate:** charge or discharge current relative to capacity. 0.5C of a 100 Ah battery is 50 A.
- **Depth of discharge (DoD):** how much you use before recharging.

A simple sizing method

- 1. Add up the load in amps (or watts divided by voltage).
- 2. Multiply by the hours of runtime you need. That is the amp-hours used.
- 3. Divide by the usable fraction: about 0.5 for lead-acid, about 0.9 for lithium.
- 4. The result is the rated capacity to specify.

WORKED EXAMPLE

A 10 A load for 5 hours is 50 Ah used. On lead-acid at 50% DoD, specify about 100 Ah. On lithium, about 55 to 60 Ah covers the same job.

Do not forget

- High discharge rates reduce usable capacity on lead-acid (Peukert effect); size up for heavy loads.
- Cold reduces capacity; size for the coldest expected operating temperature.
- Check the C-rate the equipment needs is within the battery rating.

Need help choosing or specifying?

Talk to ATB for datasheets, fitment and custom configurations.

Request specifications