

Some Basic Battery Terms

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Many new EV owners are not super technically inclined but do have enough curiosity to want to understand what they are dealing with. Here is a brief overview of some common terms that are often tossed around. Scan these for a quick calibration and confirmation that we are all on the same page. Occasionally reviewing basics can help you remember the concepts. If you find you already know these, great! You've come a long way on your journey!

Ampere-hour capacity:

The quantity of stored electrical energy, measured in ampere-hours, that the battery can deliver from its completely charged state to its discharged state. The dischargeable capacity depends on the rate at which the battery is discharged; at higher discharge rates the available capacity is reduced. What the fully charged and discharged states are varies, depending on the chemistry used. The capacity of each cell is considered with the sum of all of them being the battery capacity.

C-rate:

This rating system helps do performance comparison of different sizes of cells and is used as a standard. It is the discharge rate, in amperes, at which a battery can deliver one hour (1 h) of capacity to a fixed voltage endpoint. Fractions or multiples of the C-rate also are used. C/2 refers to the rate at which a battery will discharge its full capacity in 2 h; 2C is twice the C-rate or that rate at which the battery will discharge its capacity in 0.5 h. It is determined by the battery manufacturer, and depends on many technical parameters, including electrode dimensions, spacing, chemical composition of the electrolyte, etc.

Electrolyte:

An ionically conductive liquid medium that allows ions to flow between the positive and negative plates of a cell.

Monobloc:

A group of two or more cells connected in series and housed in a one-piece enclosure with suitable dividing walls between cell compartments. Typical EV monoblocs used to come in 6-V or 12-V configurations. Today, monoblocs are sometimes called modules.

Nominal voltage:

The characteristic operating voltage of a cell or battery. The nominal voltage is 2.0 V for lead-acid cells and 1.2 V for nickel-cadmium cells. Lithium ion cells have 3.5 V or 3.6 V or other nominal voltage levels which represent the approximate cell voltage during discharge at the C-rate under room-temperature conditions. The actual discharge voltage depends on the state-of-charge, state-of-health, discharge time, rate of discharge (see above), and temperature. This is a voltage under load; but is not the same as an open circuit (disconnected) voltage!

Separator:

An electrically insulating material that is used to prevent metallic contact between the positive and negative plates in a cell, but permits the flow of ions between the plates. In flooded cells, the separator includes a gas barrier to prevent gas diffusion and recombination of oxygen. In sealed cells, the separator is intended to allow gas diffusion to promote high recombination efficiency.

State-of-charge:

The available capacity of a battery divided by the capacity available when fully charged, normally expressed on a percentage basis. Sometimes referred to as "true state-of-charge." This is too technical for most casual EV drivers today, and is often translated into "miles remaining" on the in-car displays.

State-of-health:

The available capacity of a fully charged battery divided by the rated capacity of the battery, normally expressed on a percentage basis. Sometimes referred to as “apparent state-of-charge.” This can also be used in a more qualitative sense to indicate the general condition of the battery.