



BATTERIES BASICS

Answers to common questions about battery technology



Batteries have been around so long (since at least the late 1700s), that most users take them for granted. But when you think about it, advancements in battery technology have dramatically changed the workplace. They're used on jobsites to power flashlights, calculators, laser levels, stud finders, handheld digital devices and much more.

This article from Energizer, an IDC Preferred Supplier, provides a brief overview of the most common batteries used by

working professionals today. It also addresses common myths about batteries and provides advice on the proper handling and disposal of batteries.

In simple terms, batteries come in two basic types: single-use and rechargeable.

Single-use batteries, also known as primary batteries, have one life cycle and must be replaced when drained. Examples include alkaline, carbon-zinc, lithium, silver-zinc and zinc air.

PHOTO: LES CUNLIFFE / ENERGIZER



Rechargeable batteries, also known as secondary batteries, can be recharged and used repeatedly. Examples of rechargeable batteries include nickel metal hydride (NiMH), nickel cadmium (NiCd), lithium ion (LiIon) and sealed lead acid (SLA) batteries.

Here's a look at some of the most common battery types that Energizer offers.

Energizer MAX

Energizer MAX with Power Seal Technology holds power for up to 10 years while in storage, providing long life for devices used every day.

- Best for household electronics
- Most popular long-lasting power source
- Very good shelf-life — up to 10 years

Energizer Advanced Lithium

Energizer Advanced Lithium battery technology maximizes your gear's performance and keeps you going non-stop.

- Best for high drain/high-tech devices
- High performance battery for the devices you rely on
- Great storage life — 10 years
- 33% lighter than alkaline systems

Energizer Ultimate Lithium

Energizer Ultimate Lithium batteries deliver long-lasting power to keep up with today's high-tech, power hungry devices like digital cameras, photo flash units and handheld GPS devices.

- Best for heavy drain/high-tech devices
- Excellent extreme temperature performance
- Great storage life — 15 years
- 33% lighter than alkaline systems

Energizer Rechargeable

High-tech devices demand high-powered batteries. Energizer Recharge Power Plus batteries deliver more power in every charge, making them ideal for the power-hungry devices such as digital cameras, handheld GPS, MP3 players and electronic games.

- Energizer Recharge Power Plus batteries last 4X longer in digital cameras and hold their charge for up to 1 year.
- Best for frequent use/heavy drain devices
- Recharges hundreds of times
- Limited shelf-life — loses 1% of deliverable energy per day



Common battery questions

Users often hold onto common misconceptions about how to extend a battery's life or improve its performance. For example, some people think they can extend the life of a battery by storing it in a refrigerator or freezer. In fact, cold temperature storage can harm batteries if condensation results in corroded contacts or label or seal damage due to extreme temperature storage. To maximize performance and shelf life, store batteries at normal room temperatures (68 F to 78 F or 20 C to 25 C) with moderated humidity levels (35 to 65% RH).

When stored at room temperature (i.e. 70 F/ 21 C), cylindrical alkaline batteries have a shelf life of five to 10 years and cylindrical carbon zinc three to five years. Lithium Cylindrical types can be stored from 10 to 15 years. Prolonged storage at elevated temperatures will shorten storage life.

Another common error involves mixing batteries of different chemistries or brands in a single device. Mixing battery types (different chemistries,

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NiMH batteries are more environmentally friendly than NiCd batteries

or the loss of battery capacity due to partially discharging and recharging repetitively without the benefit of a full discharge. This was evident with early nickel cadmium (NiCd) rechargeable batteries but is not found in nickel metal hydride batteries (NiMH) currently manufactured. Both types of batteries are rechargeable but NiMH batteries have a higher energy density (ratio of energy to volume). NiMH batteries are also considered more environmentally friendly than NiCd batteries.

When not in use, nickel metal hydride batteries will lose 20% to 50% of their charge within six months due to self-discharge. Several factors such as cell size, construction and storage temperature can impact the self discharge rate. NiMH batteries that have not been used for an extended period of time should be recharged before being put into use to obtain maximum performance.

Another common question concerns overcharging batteries. NiMH batteries are sensitive to continuous over charge. A smart charger monitors the cell condition during charge and prevents overcharging and subsequent negative impact on battery cycle life. Smart chargers

brands and/or fresh vs. used) in a device is not recommended and can significantly increase the potential for leakage and reduced device run time. The primary concern is an imbalance in capacities or available energy between the installed batteries. As the weakest battery becomes exhausted, it will be forced discharged by the stronger batteries to very low or negative voltage levels which drastically increases the potential for leakage.

Typically, alkaline batteries will not leak under normal storage or usage. The potential for leakage significantly increases if the

batteries are subjected to charging, mixing of battery chemistries, mixing of fresh and used batteries, physical damage, extended exposure to high temperature or deep discharged. Alkaline battery leakage is extremely caustic and contact with bare skin should be avoided. In the event that battery leakage comes in contact with your skin, flush the area for 15 minutes with copious amounts of water and seek medical attention.

There are also many common misconceptions surrounding the use of rechargeable batteries. One of the most misunderstood areas concerns memory effect,

use microprocessor circuitry to monitor battery parameters such as temperature, voltage and state of charge. This information is used by the charger to determine when to terminate the charge.

In normal use, NiMH batteries can be recharged hundreds of times. Many factors effect cycle life. Some of these factors include depth of discharge, charge and discharge current, method of charge control, storage and operating conditions and shelf life. Typically batteries with a higher mAh capacity will have a lower cycle life than lower mAh capacity batteries.

Battery disposal

Regulations may vary by municipality or state so please check your local regulations.

Most everyday use batteries are alkaline and lithium, which in most states can be disposed of via your normal waste management process. This is possible because today's batteries no longer contain heavy metals, such as mercury. Therefore, these products don't contain any hazardous materials, as classified under federal EPA guidelines.

Most rechargeable batteries used today are considered non-hazardous based on their "metal" content, which is nickel metal hydride and lithium ion. Therefore, they can be disposed of according to U.S. federal guidelines. However, users should recycle their rechargeable batteries to capture those that do contain hazardous waste such as lead acid and nickel cadmium. ♻️

CARE AND HANDLING DOS & DON'TS

DO:

Following are recommendations that should be followed to obtain maximum battery performance.

- Do read the instructions on your device before installing batteries. Make sure to insert the batteries properly, following the symbols showing you the correct way to position the positive (+) and negative (-) ends of the batteries.
- Do replace batteries with the size and type specified by the device's manufacturer. Remove all used batteries from the device at the same time, and then replace them with new batteries of the same size and type.
- Do store batteries in a cool, dry place at normal room temperature. Remove batteries from devices that will be stored for extended periods.
- Do inspect a device's battery compartment every few months to be sure batteries are not leaking.
- Do keep battery contact surfaces clean by gently rubbing with a clean pencil eraser or cloth.

DON'T:

Following are recommendations that users should follow to prevent problems or situations that could lead to personal injuries.

- Don't carry loose batteries in a pocket or purse with metal objects

like coins, paper clips, etc. This could potentially short-circuit the battery, generating high heat. When unpacked batteries are mixed together, they can easily short-circuit each other, particularly button-type batteries.

- Don't recharge a battery unless it is specifically marked "rechargeable." Attempting to recharge a primary (non-rechargeable) battery could result in rupture or leakage.

- Don't use rechargeable batteries in chargers that are not designed for the specific battery type.

- Don't put batteries or battery-powered devices in hot places – elevated temperatures increase the self-discharge of batteries.

- Do not dispose of batteries in fire.

- Don't mix old and new batteries, or mix different types or makes of batteries. This can cause rupture or leakage, resulting in personal injury or property damage.

- Don't crush, puncture, take apart batteries or otherwise damage batteries. This can cause rupture or leakage, resulting in personal injury or property damage.

- Don't allow children to play with batteries.