

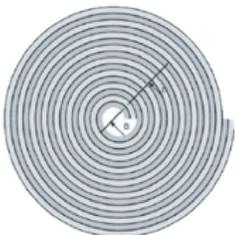
FAQs

What is the Best Rechargeable Microbattery Available for Hearables and Wearables?

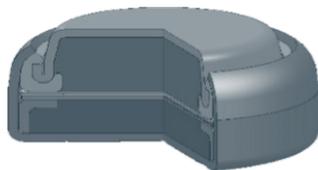
This FAQ covers the major benefits of ZPower's silver-zinc microbatteries. ZPower batteries are the smallest, safest, highest-energy rechargeable microbatteries available. They are a good choice for designers and engineers aiming to enable new, next-generation smaller and safer consumer and medical products.

Why should I switch from my present battery technology to silver-zinc technology?

Higher energy density might be your first reason. ZPower silver-zinc microbatteries offer higher energy density values than any other battery within the same volume range (<250 mm³). Today, ZPower microbatteries offer a density of about 340 watt-hours per liter (Wh/L) at a size of 156mm³. And energy density remains high even as the battery's volume shrinks. With planned increases in electrode utilization, ZPower microbatteries will have energy densities of approximately 400Wh/L from 2020. In contrast, Li-ion batteries might maintain competitive energy densities at volumes above 625mm³ but as the Li-ion cell shrinks to microbattery size, inherent constraints in the "jelly-roll" implementation of the electrodes limits the amount of active material that can be placed in the cell. This lowers the cell's capacity. Coupled with the significantly lower current density of the Li-ion electrodes, the Li-ion cell's performance scales down dramatically with size.



Cross-section of Li-ion jelly-roll.



ZPower XR41 Planar construction.

What enables the small size of silver-zinc rechargeable batteries?

The battery chemistry and construction enable the small size. Thanks to the significantly higher electrode current densities of silver-zinc batteries, ZPower can make the most efficient use of space in the microbattery size through planar cell construction. Also, ZPower batteries do not require the additional safety circuits required by all Li-ion batteries. These safety circuits add bulk and consume valuable design space.

What is the cycle-life of ZPower batteries?

Unlike Li-ion batteries, which lose a little capacity each cycle, the discharge capacity of ZPower silver-zinc microbatteries stays consistent throughout the first 300 cycles and remains at >85% at 500 cycles under nominal operating conditions. If product requirements require a greater cycle life, the charge method can be modified to provide even more cycles, but at a slightly reduced capacity.

How are ZPower batteries charged?

ZPower's patented charging method ensures that a bare cell can be charged to its rated capacity without the benefit of a battery management system providing data to the charger. The silver-zinc charger uses a similar CC-CV (constant current-constant voltage) method to charge Li-ion cells, but with different limits. The CC limit is defined by the cell's capacity, while the CV limit can vary based on the cell's state of charge and other factors. This means that the conditions where the silver-zinc charger terminates its charge are different compared to Li-ion chargers, which terminate on a trickle current condition. Plus, the charge algorithm can be tailored to different applications or use conditions.

How safe are silver-zinc microbatteries?

Silver-zinc batteries are aqueous so there is no threat of thermal runaway or fire. Also, the danger associated with ingestion is significantly lower when compared to Li-ion batteries due to silver-zinc's lower voltage. Because of these safety benefits, silver-zinc batteries are ideal for devices that are body worn.

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Are silver-zinc batteries subject to the same onerous regulatory approvals and certifications as Li-ion batteries?

No, silver-zinc batteries are treated like other alkaline batteries. They are not subject to country and regulatory certifications.

Are there shipping or labeling requirements for silver-zinc batteries?

No. Because silver-zinc batteries are aqueous batteries, they are treated and handled the same as other common alkaline batteries. There is no need for them to be restricted from any mode of transportation. In contrast, Li-ion batteries are categorized as dangerous goods, most are class 9 hazardous goods and are subject to special packaging, labeling, and shipping restrictions. Defective Li-ion cells cannot be shipped by air under any circumstances, a major logistical task for getting products back from the field. ZPower cells, due to their safe chemistry, do not require special shipping classification to return defective product.

Are silver-zinc batteries recyclable?

Yes, the water-based electrolyte and the zinc anode of the silver-zinc batteries are easily recyclable—without having to be treated as hazardous and dangerous goods like Li-ion batteries.

Are there products that currently use ZPower batteries?

Yes, ZPower batteries are used in miniature consumer electronics, hearing aids, and body-worn medical devices. A full list of products powered by ZPower batteries can be found at www.zpowerbattery.com.

Smaller Batteries. Bigger Energy.

ZPower is delivering the next big thing in microbattery power.

With our unique silver-zinc technology, manufacturing expertise and customization capabilities, we're helping manufacturers think smaller about bigger innovation.



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