Battery handling best practice

Many of us look upon batteries as relatively low-tech disposables that should "just work". Batteries are however complex electro-chemical components that cannot be allowed to fail when used in mission-critical communication devices.

Expected battery lifetime

Rechargeable lithium-ion batteries gradually lose capacity over time. Modern smartphone batteries are typically designed to retain at least 80% of their original capacity after approximately 800–1,000 full charge cycles, although actual lifetime depends on battery design, operating temperature, charging conditions and usage. A full charge cycle refers to the process of dis-charging a battery from 100% to 0%, then charging it to 100% again. If a battery is only half empty when charging begins, the process counts as half a charge cycle.

Correct handling and charging is essential in order to maximize battery lifetimes. For example, charging a battery in extremely high or low temperatures can render it unusable after only 10–20 charge cycles—despite it being designed for a minimum lifetime of 400 charge cycles. Consult the Ascom Technical Document “Battery Storage and Maintenance Guidelines” (TD 92982EN) for more information about lifetimes, charging and storage guidelines.

The benefits of using original batteries and chargers

More often than not, handset manufacturers design their products to be used with a specified battery and charger. The reason is simple: from a power supply perspective, a handset, its battery and its charger are parts of an integrated single system. Using a non-specified part (e.g. a third-party charger) may risk charging the battery with too high a current, stressing the battery and shortening its lifetime.

But there are more serious risks. An improperly designed or manufactured battery could pose a serious security risk. True, third-party batteries may be available with higher capacity than those specified by handset manufacturers. But there is a potential for reduced quality performance or an elevated risk of over-heating. Moreover, just because a battery bears applicable regulatory markings (e.g. CE in Europe) is no guarantee that it has been designed to work specifically with the charging circuits in a particular handset or charger. The safest course of action is to always use batteries and chargers recommended by the handset manufacturer.

Ascom batteries have feature built-in dual protection circuit that protect against short circuits and over-charging/dis-charging. Safety is further enhanced by hardware control of charging-temperature management. An additional safety layer is provided by the battery-encapsulated cell, which will prevent an open flame if the battery overheats.

Lifetime in light-use environment, e.g. office

If a handset is used 220 days a year and is half empty at the end of a typical working day, the battery will have accumulated approximately 800 equivalent full cycles after about seven years (800 charge cycles / 220 working days annually / 0.5 charge cycles a day = 7.23 years).

Lifetime in heavy-use environment, e.g. 24/7 use in hospital

If a handset is charged twice daily, with 10% left, used 365 days a year, the battery will have accumulated approximately 800 equivalent full cycles after about 15 months (800 charge cycles / 365 days annually / (2 * 0.9 charge cycles a day) = 14.6 months).

Avoiding no-fault found penalties

Typically, between five and 15 percent of all handsets sent in for repair are found to be fully functioning after screening. Some only need a new battery to work perfectly again. Keeping a few spare batteries on site means your organization can replace batteries as needed, avoiding downtime and possible no-fault found penalties.

Batteries on site

Having a few extra batteries on hand is a small price to pay compared to the significant costs that can be incurred because of non-functioning handsets.

Battery fleet management

Professional users expect more from their workplace handsets than private individuals do from their consumer devices. They, for instance, expect their charged handsets to make it through a shift without needing additional charging.

With heavily used handsets, equivalent full cycles accumulate more quickly. After 15 months of heavy use, available battery capacity and performance may have gradually declined due to usage and aging. This makes it essential to have in place an efficient battery management process. The most cost-efficient method for professional users is to regularly replace all batteries simultaneously on site. The frequency of replacement depends on the usage pattern of the handsets.

Many professional handsets come with user-replaceable batteries. This makes it possible to use the handset 24/7, and charge the battery in a separate battery pack charger. Do not use the charger for long-term battery storage. Batteries should be removed from the charger once fully charged. Batteries that are to be stored for more than a few days should be discharged to a state of charge of 70% or less before storage. For heavily used handsets, it is recommended to have one spare battery for each handset in order to always have a fully charged battery at hand. Users in office environments may need 10–60 percent additional batteries to ensure that fully charged batteries are available when required.

IT and communication partners usually offer services to maintain their enterprise customers' investments. Annual preventive maintenance checks, a service phone desk, and product repairs are the basic post-sales services required to keep an investment in top shape. Some partners also regularly replace and properly recycle complete fleets of batteries as part of their service offering.

Correct shipping of Li-ion batteries

Lithium-ion batteries (LIB) provide high levels of power and the electrical energy in these batteries is significant. Such batteries can sometimes generate a great amount of heat if short-circuited. In addition, the chemical contents of a LIB, or the materials surrounding it, may catch fire if the battery is damaged. Overheating due to design or manufacturing faults is very rare for batteries from the original manufacturer, but may be an issue if non-specified batteries are used. For these reasons, stringent regulations control the shipment of LIBs. Damaged LIBs are not allowed on airplanes, and freight companies must comply with LIB transport regulations published by IATA [www.iata.org].

All used batteries are considered potentially damaged, and may be refused by freight companies. New batteries can be sent using normal freight, but they must be packaged in accordance with the carrier's instructions. Different carriers have different regulations and policies, and some refuse to ship improperly packaged LIBs.

User-replaceable batteries should be removed from handsets due to be shipped for repair or inspection. If not removed, there is a risk carriers may refuse to handle the shipment, resulting in unnecessary delays.

Safety and Li-ion batteries

LIBs offer several key benefits: high energy density, no 'memory effect', and very low self-discharging. However, the use of lithium in the cell chemistry does pose a risk of swelling in the battery. In very exceptional cases the battery may overheat and ignite adjacent materials.

Although the risk of swelling and combustion in LIBs is small, the risk naturally increases among large installed bases. Using third party chargers or batteries increases this risk—hence the importance of using only chargers and batteries approved by the original handset manufacturer. And correctly managing and handling LIBs should be a priority at all organizations where they are deployed.

Battery swelling: what causes it, how to deal with it

LIBs expands when gas builds up inside the airtight pouch holding the battery cell. For safety reasons, this gas remains inside the pouch. This is an anticipated process, and some gradual expansion of the cell may occur over the course of a lithium-ion battery's lifetime. Correctly designed and manufactured LIBs allow a sufficient margin to accommodate this expansion. However, even a correctly designed and manufactured battery may swell more than expected if used incorrectly.

In rare cases, the swelling in a LIB cell becomes visible. Any battery showing visible swelling, deformation, leakage, unusual odor or mechanical damage should be removed from service immediately. Do not charge, use, ship or transport a battery with visible swelling.

Contact Ascom for guidance and arrange for proper recycling in accordance with applicable requirements. Battery suppliers rely on non-conformity feedback to help their continuous improvement efforts.

Batteries should be inspected for visible damage or abnormal deformation as part of normal maintenance activities. Damaged batteries must be handled, transported and disposed of in accordance with applicable local regulations and safety procedures.

Ascom battery-powered products and related services
Ascom handsets and other battery-powered devices are designed for professional users and mission-critical processes in demanding, enterprise-grade environments: hospitals, factories, hotels, large retail units, etc. As such, all Ascom products and solutions undergo rigorous testing, and are of course certified by the relevant regulators in all markets. Also, as a world-leading provider of enterprise-grade communication solutions, Ascom offers numerous battery fleet management services around the world.

Want to learn more?
To learn more, contact your local Ascom representative.



The Li-ion battery on the left is visibly swollen. Never attempt to use visibly swollen or damaged batteries, and do not ship or transport them. Properly dispose of such batteries as soon as possible, and report them to your suppliers.

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About Ascom
Our vision is a world where the right information moves people forward. Our mission is to put the right information in the right hands at the right time so that people can make the best possible decisions.

We are a global provider of communication and collaboration solutions for the acute care, long-term care and enterprise sectors. Our solutions are based on intelligent integrations with software and hardware that are open source and compatible with third party solutions. Every single second, our systems generate large amounts of data, which we then turn into useful and actionable information. This helps us to bring data to life for people in the toughest operational environments, ensuring smooth, complete, and efficient workflows.

Ascom is headquartered in Baar (Switzerland), has operating businesses in 19 countries and employs around 1,400 people worldwide. Ascom registered shares (ASCN) are listed on the SIX Swiss Exchange in Zurich.

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