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AA battery

The **AA battery**—also called a *double A* or *Mignon* (French for "dainty") battery—is a standard size single cell cylindrical dry battery. The IEC 60086 system calls it size **R6**, and ANSIC18 calls it size **15**.[1] Historically, it is known as **SP7** (Standard Power 7) or **HP7** (High Power 7) in official documentation the United Kingdom, though it is colloquially known as a "double A battery".

AA batteries are common in portable electronic devices. An AA battery is composed of a single electrochemical cell that may be either a primary battery (disposable) or a rechargeable battery. The exact terminal voltage and capacity of an AA size battery depend on cell chemistry; however, devices designed for AA will usually only take 1.5 V unless specified by the manufacturer.

Introduced in 1907,[2] the AA battery size was standardized by the American National Standards Institute (ANSI) in 1947, but it had been in use in flashlights and electrical novelties before formal standardization. ANSI and IEC Battery nomenclature gives several designations for cells in this size, depending on cell features and chemistry.

AA cells

Contents

Dimensions

An AA cell measures 49.2–50.5 mm (1.94–1.99 in) in length, including the button terminal—and 13.5–14.5 mm (0.53–0.57 in) in diameter. The positive terminal button should be a minimum 1 mm high and a maximum 5.5 mm in diameter, the flat negative terminal should be a minimum diameter of 7 mm.[1] 14500 Lithium Batteries are longer if they feature a protection circuit up to 53mm.

Alkaline AA cells have a weight of roughly 23 g (0.81 oz),[3] lithium AA cells around 15 g (0.53 oz),[4] and rechargeable Ni-MH cells around 31 g (1.1 oz).[5]

Chemistry and capacity

D, C, **AA**, AAA, AAAA cells, and a 9-volt battery

Primary cells

Primary (non-rechargeable) zinc–carbon (dry cell) AA batteries have around 400–900 milliampere hours capacity, with measured capacity highly dependent on test conditions, duty cycle, and cut-off voltage. Zinc–carbon batteries are usually marketed as "general purpose" batteries. Zinc-chloride batteries store around 1000 to 1500 mAh are often sold as "heavy duty" or "super heavy duty". Alkaline batteries from 1700 mAh to 3000 mAh cost more than zinc-chloride batteries, but hold additional charge.

Non-rechargeable lithium iron disulfide batteries are manufactured for devices that use a lot of power, such as digital cameras, where their high cost is offset by longer running time between battery changes and more constant voltage during discharge. Another advantage of lithium disulfide batteries compared to alkaline batteries is that they don't tend to leak. This is particularly important in expensive equipment, where a leaking alkaline battery can cause damage to the point of requiring replacement of the equipment. Lithium iron disulfide batteries are intended for use in equipment compatible with alkaline zinc batteries. Lithium-iron disulfide batteries can have an open-circuit voltage as high as 1.8 volts, but the closed-circuit voltage decreases, making this chemistry compatible with equipment intended for zinc-based batteries. A fresh alkaline zinc battery can have an open-circuit voltage of 1.6 volts, but an iron-disulfide battery with an open-circuit voltage below 1.7 volts is entirely discharged.[6]

Rechargeable cells

Rechargeable batteries in the AA size are available in multiple chemistries: nickel–cadmium (NiCd) with a capacity of roughly 600–1000 mAh,[7] nickel–metal hydride (NiMH) in various capacities of 1300–3500 mAh and lithium-ion. Lithium ion chemistry has a nominal voltage of 3.6-3.7 volts, and are referred to as 14500 Li-ion batteries rather than AA.

Nickel-zinc cell (NiZn) AAs are also available, but not widely used.


A solar-powered charger for rechargeable AA batteries

Comparison

Panasonic Eneloop 1.2 Volt NiMH rechargeable batteries in AA and AAA

Type	Zinc–Carbon	Alkaline	RAM	Li-FeS_2	Li-ion	NiCd	NiMH	NiZn
IEC name	R6	LR6	LR6	FR6	?	KR6	HR6	ZR6
ANSI/NEDA name	15D	15A	15A	15LF	14500	1.2K2	1.2H2	?
Capacity under 50 mA constant drain	400–1700 mAh	1800–2600 mAh	1800–2600 mAh	2700–3400 mAh	600-840 mAh	600–1000 mAh	600–2850 mAh	1500–1800 mAh
Nominal voltage	1.5 V	1.5 V	1.5 V	1.5 V	3.6-3.7 V	1.2 V	1.2 V	1.6-1.65 V
Max. energy at nominal voltage and 50 mA drain	2.55 Wh	3.90 Wh	3.90 Wh	5.10 Wh	2.88-2.96 Wh	1.20 Wh	3.42 Wh	2.97 Wh
Rechargeable	No	Some	Yes	No[8]	Yes	Yes	Yes	Yes

Use

In 2011, AA cells accounted for approximately 60% of alkaline battery sales in the United States. In Japan, 58% of alkaline batteries sold were AA, known in that country as *tansan* (単三). In Switzerland, AA batteries totaled 55% in both primary and secondary (rechargeable) battery sales.[9][10][11]

See also

- List of battery sizes
- Battery nomenclature

References

1. Classic (LR6) (http://data.energizer.com/PDFs/LR6CL_EU.pdf) datasheet from energizer.com
2. "About Eveready®" (http://www.eveready.com/about-us/Pages/about-eveready.aspx). *Eveready*. Retrieved August 8, 2017.

3. "Energizer Alkaline AA Battery Specification" (http://data.energizer.com/PDFs/E91.pdf) (PDF). *Product Datasheet*. Energizer. Retrieved October 21, 2015.
4. "Energizer Lithium AA Battery Specification" (http://data.energizer.com/PDFs/l91.pdf) (PDF). Energizer. Retrieved October 21, 2015.
5. "Energizer NiMH AA Battery Specification" (http://data.energizer.com/PDFs/nh15-1500.pdf) (PDF). Energizer. Retrieved October 21, 2015.
6. *Lithium Iron Disulfide Handbook and Application Manual*, Version LI4.04, Energizer Battery Manufacturing Inc.
7. Bergveld, H; Kruijt, W; Notten, P (February 1999). "Electronic-network modelling of rechargeable NiCd cells and its application to the design of battery management systems". *Journal of Power Sources*. **72** (2): 143–158. doi:10.1016/S0378-7753(98)00188-8 (https://doi.org/10.1016%2FS0378-7753%2898%2900188-8).
8. Lithium Iron Disulfide, Handbook and Application Manual (http://data.energizer.com/PDFs/lithiuml91l92_appman.pdf)
9. Absatzzahlen 2008 (https://web.archive.org/web/20111114174228/http://www.inobat.ch/fileadmin/user_upload/pdf_09/Absatz_Statistik_2008.pdf) INOBAT 2008 statistics.
10. Life Cycle Impacts of Alkaline Batteries with a Focus on End-of-Life – EPBA-EU (https://web.archive.org/web/20160303173602/http://www.epbaeurope.net/documents/NEMA_alkalinelca2011.pdf)
11. Monthly battery sales statistics – MoETI – March 2011 (http://www.baj.or.jp/e/statistics/02.php)

External links

- Datasheet for Energizer alkaline AA battery (E91) (http://data.energizer.com/PDFs/E91.pdf)
- Datasheet for Energizer lithium AA battery (L91) (http://data.energizer.com/PDFs/L91.pdf)
- Datasheet for Duracell alkaline AA battery (MN1500) (https://d2ei442zrkqy2u.cloudfront.net/wp-content/uploads/2016/03/MN1500_US_CT1.pdf)
