

List of battery sizes

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This article lists the sizes, shapes, and general characteristics of some common primary and secondary battery types in household and light industrial use.

Historically the term "battery" referred to a collection of electrochemical cells connected in series,^[1] however in modern times the term has come to refer to any collection of cells packaged in a container with external connections provided to power electrical devices,^[2] leading to the variety of standardized form factors available today.

The long history of disposable dry cells means that many different manufacturer-specific and national standards were used to designate sizes, long before international standards were agreed upon. Technical standards for battery sizes and types are published by standards organizations such as International Electrotechnical Commission (IEC) and American National Standards Institute (ANSI). Many popular sizes are still referred to by old standard or manufacturer designations, and some non-systematic designations have been included in current international standards due to wide use.

The complete nomenclature for the battery will fully specify the size, chemistry, terminal arrangements and special characteristics of a battery. The same physically interchangeable cell size or battery size may have widely different characteristics; physical interchangeability is not the sole factor in substitution of batteries.



4.5-volt, D, C, AA, AAA, AAAA, A23, 9-volt, CR2032 and LR44 batteries

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Standardization

The current IEC standards for portable primary (non-rechargeable) batteries bear the 60086 number. The relevant US standards are the ANSI C18 series, which are developed by a committee of the US National Electrical Manufacturers Association (NEMA).

Both standards have several parts covering general principles, physical specifications and safety. Designations by IEC and ANSI standards do not entirely agree, although harmonization is in progress. Manufacturers further have their own systematic identification of cell types, so cross-reference tables are useful to identify equivalent types from different manufacturers.^[3]

Lead-acid automotive starting, lighting and ignition batteries have been standardized according to IEC standard 60095 and in North America by standards published by BCI.

Non-standard brand-specific names

Manufacturers may assign proprietary names and numbers to their batteries, disregarding common, colloquial, IEC, and ANSI naming conventions (see LR44 battery as an example). Often this is done to steer customers towards a specific brand, and away from competing or generic brands, by obfuscating the common name. For example, if a remote control needs a new battery and the battery compartment has the label, "Replace with CX472 type battery," many customers will buy that specific brand, not realizing that this is simply a brand name for a common type of battery. For example, British standard "U" series batteries were often sold under manufacturer prefixes such as "C", "SP", "HP", etc.; Ever Ready sold "U2" (D) batteries as "SP2" (standard-duty zinc carbon) and "HP2" (heavy duty zinc chloride).

On the other hand, with obscure battery types the designation assigned by a specific brand will sometimes become the most common name for that battery type, as other manufacturers copy or modify the name so that customers recognize it.

Battery chemistry

The terminal voltage of a battery cell depends on the chemicals and materials used in its construction, and not on its physical size. For example, primary (non-rechargeable) alkaline batteries have a nominal voltage of 1.5 volts. Rechargeable NiCd (nickel cadmium) and NiMH (nickel metal hydride) typically output 1.25 volts per cell. Devices intended for use with primary batteries may not operate properly with these cells, given the reduction in voltage.

Dry Leclanche (carbon-zinc), alkaline and lithium batteries are the most common modern types. Mercury batteries had stable cell terminal voltages around 1.35 volts. From the late 1940s until the mid-1990s, mercury batteries were made in many consumer and industrial sizes. They are no longer available since careless disposal can release toxic mercury into the environment. They have been replaced by zinc-air batteries, which also produce 1.35 volts.

The full battery designation identifies not only the size, shape and terminal layout of the battery but also the chemistry (and therefore the voltage per cell) and the number of cells in the battery. For example, a CR123 battery is always Li-MnO₂ ('lithium') chemistry, in addition to its unique size.

The following tables give the common battery chemistries for the current common sizes of batteries. See Battery Chemistries for a list of other electrochemical systems.

Physical interchangeability

Cylindrical cells typically have a positive terminal nub at one end, and a flat negative terminal at the other. A cell with a nub on the positive terminal is called a **button-top**, and a cell without a positive nub is called a **flat-top**. Two different cells of the same nominal size, e.g. two 18650 cells, may have different diameter buttons if made by different manufacturers, and this can lead to incompatibility with devices. Flat-top cells cannot be used in series without modification or soldering into position, because the flat positive terminal of one cell cannot contact with the next cell's negative terminal. Rarely however, a manufacturer may include tiny bumps on the *negative* terminal, so flat-tops can be used in series.




It is important to check the battery contacts in a device before attempting to install cells, because some will not work with flat-tops or with button-tops whose buttons are the wrong diameter. Some devices have a small bump or spring where the positive terminal of the cell connects, and this allows the use of either button- or flat-top cells. Other devices have a flat area that can only be contacted by a button-top. To prevent damage if a cell is inserted backwards, some devices have a raised plastic ring around the positive contact. This stops the flat negative end of a cell from connecting accidentally, but also stops the positive end of a flat-top or of a button-top with too large button from connecting.

Cylindrical batteries

These are all round batteries with height greater than their diameter. In zinc-carbon or alkaline types they produce around 1.5 volts per cell when fresh. Other types produce other voltages per cell (as low as 1.2 volts for rechargeable nickel-cadmium, up to around 3 volts for lithium/manganese dioxide). This form has a positive nub terminal at the cap of the cell, and the negative terminal at the bottom of the can; the side of the can is not used as a terminal.

Most common name / image	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Nominal voltage	Size, dia. × h. mm	Comments
½AA 	SAFT LS14250 Tadiran TL5101 UL142502P	CR14250 (Li–MnO ₂) ER14250 (Li–SOCl ₂)		850–1200	3 V (Li–SOCl ₂) 3.6 V (Li–MnO ₂)	14.5 × 24	Same diameter as AA battery, used in small electronics, including pulse oximeters, as well as use in some computer models (such as most pre-Intel Macintosh models and some older IBM PC compatibles) as the CMOS battery. Also used in US military MILES gear and DAGR.
AAAA 	MX2500 Mini UM 6 (JIS)	LR8D425 (alkaline) LR61	25A (alkaline)	625 (alkaline)	1.5 V	8.3 × 42.5	Sometimes used in pen flashlights, laser pointers, powered styluses, calculators, fishing lures, or electronic glucose meters.
AAA 	U16 or HP16 (In Britain until the 1980s) Micro Microlight MN2400 MX2400 MV2400 Type 286 (Soviet Union/Russia) UM 4 (JIS) ^[4] 単4 #7 (China) 6135-99-117-3143 (NSN)	LR03 (alkaline) R03 (carbon–zinc) FR03 (Li–FeS ₂) HR03 (NiMH) KR03 (NiCd) ZR03 (NiOOH)	24A (alkaline) 24D (carbon–zinc) 24LF (Li–FeS ₂)	1200 (alkaline) 540 (carbon–zinc) 800–1000 (NiMH)	1.5 V	10.5 × 44.5 (0.41 × 1.75)	Introduced 1911, but added to ANSI standard in 1959
AA 	U12 or HP7 (In Britain until the 1980s) Pencil-sized Penlight Mignon MN1500 MX1500 MV1500 Type 316 (Soviet Union/Russia) UM 3 (JIS) 単3 #5 (China) 6135-99-052-0009 (NSN)(carbon-zinc) 6135-99-195-6708 (NSN)(alkaline)	LR6 (alkaline) R6 (carbon–zinc) FR6 (Li–FeS ₂) HR6 (NiMH) KR6 (NiCd) ZR6 (NiOOH)	15A (alkaline) 15D (carbon–zinc) 15LF (Li–FeS ₂) 1.2H2 (NiMH) 1.2K2 (NiCd)	2700 (alkaline) 1100 (carbon–zinc) 3000 (Li–FeS ₂) 1700–2700 (NiMH) 600–1000 (NiCd)	1.5 V	14.5 × 50.5 (0.57 × 1.99)	Introduced 1907, but added to ANSI standard sizes in 1947. Note: 14500 Lithium Batteries are not AA as they are 3.7 V.
A 		R23 (carbon–zinc) LR23 (alkaline)			1.5 V	17 × 50	More common as a NiCd or NiMH cell size than a primary size, popular in older laptop batteries and hobby battery packs. Various fractional sizes are also available e.g. 2/3A and 4/5 A.
B 	U10 (UK, pre-1980s) 336 (Russian Federation)	R12 (carbon–zinc) LR12 (alkaline)		8350 (alkaline)	1.5 V	21.5 × 60	Most commonly found within a European 4.5 volt lantern battery. Historically available in UK as a 2 cell battery type 'No 8' for bijou size torches. Not to be confused with the vacuum tube B battery.
	U11 or HP11 (In Britain until the	LR14 (alkaline) R14 (carbon–zinc)	14A (alkaline) 14D (carbon–zinc)		1.5 V	26.2 × 50 (1.03 × 1.97)	Can be replaced with AA cell using plastic

 <p>C</p>	<p>1980s) MN1400 MX1400 Baby Type 343 (Soviet Union/Russia) BA-42 (US Military Spec WWII–1980s) UM 2 (JIS) 単2 #2 (China) 6135-99-199-4779 (NSN)(carbon-zinc) 6135-99-117-3212 (NSN)(alkaline)</p>	<p>HR14 (NiMH) KR14 (NiCd) ZR14 (NiOOH)</p>		<p>8000 (alkaline) 3800 (carbon-zinc) 4500–6000 (NiMH)</p>			<p>"sabot" (size adaptor), with proportional loss of capacity.</p>
 <p>Sub-C</p>	<p>Type 323 (Soviet Union/Russian Federation)</p>	<p>KR22C429 (NiCd) HR22C429 (NiMH)</p>		<p>1200–2400 (NiCd) 1800–5000 (NiMH)</p>		<p>22.2 × 42.9</p>	<p>A common size for cordless tool battery packs. This size is also used in radio-controlled scale vehicle battery packs. 1/2-, 4/5- and 5/4-sub-C sizes (differing in length) are also available.</p>
 <p>D</p>	<p>U2 or HP2 (In Britain until the 1980s) Flashlight Battery MN1300 MX1300 Mono Goliath Type 373 (Soviet Union/Russia) BA-30 (US Military Spec WWII–1980s) UM 1 (JIS) 単1 #1 (China) 6135-99-464-1938 (NSN)(carbon-zinc) 6135-99-109-9428 (NSN)(alkaline)</p>	<p>LR20 (alkaline) R20 (carbon-zinc) HR20 (NiMH) KR20 (Ni-Cd) ZR20 (NiOOH)</p>	<p>13A (alkaline) 13D (carbon-zinc)</p>	<p>12000 (alkaline) 8000 (carbon-zinc) 2200–11000 (NiMH) 2000-5500 (NiCd)</p>	<p>1.5 V</p>	<p>34.2 × 61.5 (1.35 × 2.42)</p>	<p>Introduced 1898 as the first flashlight battery.</p>
 <p>F</p>		<p>R25 (carbon-zinc) LR25 (alkaline)</p>	<p>60</p>	<p>10500 (carbon-zinc) 26000 (alkaline)</p>		<p>33 × 91</p>	<p>Four "F" Cells are often found within 6 volt rectangular lantern batteries.</p>
 <p>N</p>	<p>Lady MN9100 UM-5 (JIS) E90 6135-99-661-4958 (NSN)</p>	<p>LR1 (alkaline) R1 (carbon-zinc) HR1 (NiMH) KR1 (NiCd)</p>	<p>910A (alkaline) 910D (carbon-zinc)</p>	<p>800–1000 (alkaline) 400 (carbon-zinc) 350–500 (NiMH)</p>		<p>12 × 30.2</p>	<p>Rechargeable nickel–cadmium and nickel–metal hydride are far less common than other rechargeable sizes.^[5] Mercury batteries of the same dimensions are no longer manufactured.</p>
 <p>A23</p>	<p>V23GA 23A 23AE MN21 L1028 8LR23 LRV08 LR23A</p>	<p>8LR932 (alkaline)</p>	<p>1811A (alkaline)</p>	<p>55 (alkaline)</p>	<p>12 V</p>	<p>10.3 × 28.5</p>	<p>Used in small RF devices such as key fob-style garage door openers, wireless doorbells, and keyless entry systems where only infrequent pulse current is used. Usually contains a stack of eight LR932 button cells shrink wrapped together.</p>
	<p>GP27A MN27 L828 27A</p>	<p>8LR732 (alkaline)</p>		<p>22 (alkaline)</p>	<p>12 V</p>	<p>8 × 28</p>	<p>Used in small RF devices such as car alarm remote controls. Can also be found in</p>

A27 							some cigarette lighters. May be made of eight LR632 cells.
BA5800	BA5800/U (Li-SOCl ₂) BA5800A/U (Li-SO ₂)			7500 (Li-SO ₂)	Li-SO ₂ : 5.3 V	35.5 × 128.5	Has both terminals at the same end and is roughly the size of two stacked D cells. Used in military hand-held devices such as the PLGR.
Duplex 	Ever Ready No. 8	2R10			3 V	21.8 × 74.6	Internally contains two 1.5 V cells hence the nickname 'Duplex' In Switzerland as of 2008, 2R10 batteries accounted for 0.003% of primary battery sales. ^[6]
4SR44 	PX28A A544 K28A V34PX	4LR44 (alkaline)		110–150 (alkaline) 170–200 (silver-oxide)	alkaline: 6.2 V silver-oxide: 6.5 V	13 × 25.2	Used in film cameras, blood glucose meters, medical instruments, dog training devices. Often simply a stack of four SR44 (LR44) button cells shrink wrapped together

Rectangular batteries

Most common name / image	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Nominal voltage (V)	Terminal layout	Dimensions (mm)	Comments
4.5-volt 	Pocketable battery 4.5V MN1203 Type 3336 (Soviet Union/Russia)	3LR12 (alkaline) 3R12 (carbon-zinc)	3LR12 (alkaline) 3R12 (carbon-zinc)	6100 (alkaline) 1200 (carbon-zinc)	<i>Alkaline carbon-zinc</i> (3 cells): 4.5	Two 6 –7 mm wide metal strips (+) : Shorter strip (–) : Longer strip	H: 67 L: 62 W: 22	This battery, introduced in 1901, was very common in continental Europe until the 1970s. In Switzerland as of 2008, 4.5-volt batteries account for only 1% of primary battery sales. ^[7]
9-volt or E^[8] 	PP3 Radio battery Smoke alarm battery Square battery Transistor battery 006P MN1604 Type Krona (Soviet Union/Russia)	6LR61 (alkaline) 6F22 (carbon-zinc) 6KR61 (NiCd) 6HR61 (NiMH)	1604A (alkaline) 1604D (carbon-zinc) 1604LC (lithium) 7.2H5 (NiMH) 11604 (NiCd) 1604M (mercury, obsolete) ^[9]	565 (alkaline) 400 (carbon-zinc) 1,200 (lithium) 175–300 (NiMH) 120 (NiCd) 500 (lithium polymer rechargeable) 580 (mercury, obsolete)	<i>Alkaline carbon-zinc</i> (6 cells): 9 <i>Lithium</i> (3 cells): 9 <i>NiMH / NiCd</i> (6, 7 or 8 cells): 7.2, 8.4 or 9.6 ^[10]	Both on same end (+) : male clasp (–) : female clasp	H: 48.5 L: 26.5 W: 17.5	Added to ANSI standard in 1959 Often contains six LR61 cells, which are similar to and often interchangeable with AAAA cells.
6-volt Lantern (Spring) 	Lantern 6 volt Spring top MN908 996 or PJ996 Energizer 529	4LR25Y (alkaline) 4R25 (carbon-zinc)	908A (alkaline) 908D (carbon-zinc)	26,000 (alkaline) 10,500 (carbon-zinc)	<i>Alkaline carbon-zinc</i> (4 cells): 6	Springs Top (+) : corner spring (–) : center spring	H: 115 L: 68.2 W: 68.2	Spring terminals, Usually contains four F cells.
Lantern (Screw) 	Lantern 6 volt Screw Top 6135-99-645-6443 (NSN)	4R25X (carbon-zinc) 4LR25X (alkaline)	915 (carbon-zinc) 915A (alkaline)	10,500 (carbon-zinc) 26,000 (alkaline)	6	Screw posts on top of battery. + Corner, – Center. Maximum diameter of the posts is 3.5 mm.	H 109.5 L 66.7 W 66.7	Used in locations susceptible to high vibration/shock where connectors may be knocked off the terminals.
Lantern (Big) 	918 R25-2 Big Lantern Double Lantern MN918 Energizer 521	4R25-2 (carbon-zinc) 4LR25-2 (alkaline)	918A	22,000 (carbon-zinc) 52,000 (alkaline)	6	Screw posts on top of battery. Marked only, no physical keying for polarity. Maximum diameter of the posts is 4.2 mm spaced 75 mm apart.	H 125.4 L 132.5 W 73	Used in locations susceptible to high vibration/shock where connectors may be knocked off the terminals.
J 	7K67	4LR61 (alkaline)	1412A (alkaline)	625 (alkaline)	6	6.5 mm ² flat contacts, – Top side, + Chamfered corner	H 48.5 L 35.6 W 9.18	Typically used in applications where the device in question must be flat, or where one should not be able to insert the battery in reverse polarity, such as a blood glucose meter or blood pressure cuff. Also good for elderly

									persons, due to its large size. Often contains four LR61 cells, which are similar to and often interchangeable with AAAA cells.
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Camera batteries

Digital and film cameras often use specialized primary batteries to produce a compact product. Flashlights and portable electronic devices may also use these types.

Image	Most common name	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Nominal voltage (V)	Shape	Terminal layout	Dimensions	Comments
 (AA battery to scale)	CR123A	Camera Battery 2/3A 123 CR123 17345 16340 CR-123A 6135-99-851-1379 (NSN)	CR17345 (lithium)	5018LC (lithium)	1500 (lithium) 700 (Li-ion rechargeable)	3 (lithium) 3.6 (Li-ion)	Cylinder	+ Nub cylinder end, – Flat opposite end	H 34.5 mm Ø 17 mm ^[11]	A lithium primary battery, not interchangeable with zinc types. A rechargeable lithium-polymer version is available in the same size and is interchangeable in some uses. According to consumer packaging, replaces (BR) 2/3A. In Switzerland as of 2008, these batteries accounted for 16% of lithium camera battery sales. ^[6] Used in flashlights.
 (AA battery to scale)	CR2	15270 (Li-Ion Rechargeable, 800 mA) 15266 (Li-Ion, 600 mA) 6135-99-606-3982 (NSN)	CR15H270 ^[12]	5046LC	750 (lithium) 600/800 (Li-Ion types)	3 (lithium) 3.6 (Li-ion)	Cylinder	+ Nub cylinder end, – Flat opposite end	H 27 mm Ø 15.6 mm	Standard Discharge Current: 10 mA A common battery type in cameras and photographic equipment. In Switzerland as of 2008, these batteries accounted for 6% of lithium camera battery sales. ^[6]
 (AA battery to scale)	2CR5	EL2CR5 DL245 RL2CR5 6135-99-577-2940 (NSN)	2CR5	5032LC ^[13]	1500	6	Double cylinder. Keyed.	Both on one end. Terminal centre spacing 16 mm.	H 45 mm L 34 mm W 17 mm	Commonly used in film and digital cameras. Shaped so that it can be inserted into a battery compartment only one way. In Switzerland as of 2008, these batteries accounted for 1% of lithium camera battery sales. ^[6]
 (AA battery to scale)	CR-P2	BR-P2 223A CR17-33 5024LC	CR-P2	5024LC ^[14]	1500	6	Double cylinder. Keyed.	Both on one end. Terminal diameter: 8.7 mm. Terminal centre spacing: 16.8 mm.	H 36 mm L 35 mm W 19.5 mm	Shaped so that it can be inserted into a battery compartment only one way. Typical mass 37 g. They contain two 3 V batteries exchangeable with CR123 batteries.
 (AA battery to scale)	CR-V3	CRV3 RCR-V3 (Li-ion)		5047LC 5047LF (primary) ^[15]	3000 (lithium) 1300 (Li-ion)	3 (lithium) 3.6 (Li-ion)	Double cylinder flat pack. Keyed.	Both on one end	H 52.20 mm L 28.05 mm W 14.15 mm	The same size as two R6 (AA) cells side by side. A rechargeable type is also made in this size. May be used in some devices not explicitly designed for CR-V3, especially digital cameras.

Button cells - coin, watch

Lithium cells

Coin-shaped cells are thin compared to their diameter. Polarity is usually stamped on the metal casing.

The IEC prefix "CR" denotes lithium manganese dioxide chemistry. Since Li-MnO_2 cells produce 3 volts there are no widely available alternative chemistries for a lithium coin battery. The "BR" prefix indicates a round lithium/carbon monofluoride cell. See lithium battery for discussion of the different performance characteristics. One Li-MnO_2 cell can replace two alkaline or silver-oxide cells.

IEC designation numbers indicate the physical dimensions of the cylindrical cell. Cells less than one centimeter in height are assigned four-digit numbers, where the first two digits are the diameter in millimeters, while the last two digits are the height in tenths of millimeters. Taller cells are assigned five-digit numbers, where the first two digits are the diameter in millimeters, followed by the last three digits indicating the height in tenths of millimeters.

All these lithium cells are rated nominally 3 volts (on-load), with open circuit voltage about 3.6 volts. Manufacturers may have their own part numbers for IEC standard size cells. The capacity listed is for a constant resistance discharge down to 2.0 volts per cell.^[16]



IEC names	ANSI names	Typical capacity (mAh)	Standard discharge current (mA)	Dimensions d. × h. (mm)	Comments
CR927		30		9.5 × 2.7	Used extensively in blinkies. Also used in some LEGO toys.
CR1025	5033LC	30	0.1	10 × 2.5	
CR1130		70		11.5 x 3.0	^[17] A rare battery, sometimes used in car security (car alarm/keyfob batteries), organizer (backup battery for PDA such as Psion etc.), and glucometer equipment. [Also some pedometers.] also k.a DL1130, BR1130, KL1130, L1130, ECR1130, KCR1130, E-CR1130, KECE1130 ^[18]
CR1216	5034LC	25	0.1	12.5 × 1.6	Used in some lighted watches and some LED decorator lights (electronic tea candles).
CR1220	5012LC	35–40	0.1 (CR) 0.03 (BR)	12.5 × 2.0	Used in keychain LED flashlights. Sometimes used instead of CR2032 in electronic tea lights.
CR1225	5020LC	50	0.2	12.5 × 2.5	Maximum discharge current: 1 mA. Maximum pulse discharge current: 5 mA.
CR1616		50–55	0.1	16 × 1.6	Used in automobile key remotes and in Game Boy cartridges (for powering the RAM for saved games).
CR1620	5009LC	75–78	0.1	16 × 2.0	Used in automobile key remotes and early digital watches.
CR1632		140 120 (BR)	0.1 (CR) 0.03 (BR)	16 × 3.2	Used in automobile key remotes. (e.g., Toyota Prius 2012)
CR2012		55	0.1	20 × 1.2	
CR2016	5000LC	90	0.1 (CR) 0.03 (BR)	20 × 1.6	Frequently used in digital watches. Often used in pairs instead of CR2032 for devices that require more than 3 V, like blue/white LED flashlights.
CR2020		115–125		20 × 2	
CR2025	5003LC	160–165	0.2	20 × 2.5	Frequently used in digital watches and automobile remotes. Also in Fitbit Zip.
CR2032	5004LC	225 (CR) 190 (BR)	0.2 (CR) 0.03 (BR)	20 × 3.2	Maximum discharge current: 3 mA. Maximum pulse discharge current: 15 mA. Commonly used on computer Motherboards as Nonvolatile BIOS memory and Real-time clock (RTC) backup batteries. This is also the most common lithium cell. Weights around 2.9 gram ^[19]
CR2040	?	280	?	20 × 4.0	3V. Used in Skytronic PRO Audible Altimeter but also flow meters and organizers (as a memory backup battery). Has become obsolete and hard to find. Other names are BR2040, DL2040, ECR2040, E-CR2040, KCR2040, KECE2040, KL2040, L2040, L24.
CR2320		110 –175 ^{[20][21][22]}		23 × 2	3 V
CR2325		165–210		23 × 2.5	The most common battery size in Soviet/Russian electronic watches, calculators and remote controls.
CR2330		265 255 (BR)	0.2 (CR) 0.03 (BR)	23 × 3.0	
BR2335 ^[23]		165 (BR)		23 × 3.5	
CR2354		560	0.2	23 × 5.4	
CR2412		100	0.2	24.5 × 1.2	
CR2430	5011LC	270–290		24.5 × 3.0	
CR2450	5029LC	610–620		24.5 × 5.0	Portable devices requiring high current (3.0 mA) and long shelf life (up to 10 years)
CR2477		1000	0.2	24.5 × 7.7	Has the highest capacity of lithium button cell batteries.
CR3032		500–560 500 (BR)	0.1 to 0.2 (CR) 0.03 (BR)	30.0 × 3.2	Continuous discharge current take from Panasonic Catalog. ^[19]
CR11108		160		11.6 × 10.8	Also called CR1/3N because it is one third the height of an alkaline N cell, and a stack of three of them will form a battery with the same dimensions as an N cell, but with 9 V terminal voltage. Such 9 V batteries in a single package do exist but are rare and only usually found in specialist applications; they can be referred to as 3CR1/3N. However 2CR1/3N, a 6 V battery consisting internally of a stack of two CR1/3N is sold by Duracell, Energizer and others. A CR1/3N was also used by photographers instead of 2 LR44 batteries, in cameras such as the Nikon EM or FE2.

Silver oxide and alkaline cells

Round button cells have heights less than their diameter. The metal can is the positive terminal, and the cap is the negative terminal.

Button cells are commonly used in electric watches, clocks, and timers. IEC batteries that meet the international IEC 60086-3 standard for watch batteries^[24] carry a "W" suffix. Other uses include calculators, laser pointers, toys, LED "blinkies", and novelties.

IEC designation numbers indicate the physical dimensions of the cylindrical cell. Cells less than one centimeter in height are assigned 4-digit numbers, where the first 2 digits are the diameter in millimeters, while the last 2 digits are the height in tenths of millimeters. Taller cells are assigned 5-digit numbers, where the first 2 digits are the diameter in millimeters, followed by the last 3 digits indicating the height in tenths of millimeters.

Cell types with an IEC SR prefix use silver oxide chemistry and provide 1.55 volts, and the IEC LR prefix batteries use alkaline chemistry and provide 1.5 volts. Common manufacturer's prefixes for these two types are SG for silver oxide and AG for alkaline. Since there are no 'common' names beyond the AG designation, many vendors use these four designations interchangeably for the same sized cell.

The functional differences are that silver oxide batteries typically has 50% greater capacity than alkaline chemistry, relatively slowly declining voltage during discharge compared to alkaline types of the same size, and superior leakage resistance. The capacity of a silver battery may be as much as twice that of an alkaline. A silver cell with a flat discharge characteristic is preferable for devices that need a steady voltage, such as photographic light meters, and devices that don't operate below a certain voltage, such as some digital calipers, which don't work below 1.38 V—.

Alkaline batteries are usually cheaper than silver oxide equivalents. Inexpensive devices are sometimes supplied fitted with alkaline batteries, although they would benefit from the use of silver oxide batteries. Exhausted silver oxide cells are often recycled to recover their precious metal content, whereas depleted alkaline cells are discarded with household trash or recycled, depending on the local practices.

Mercury batteries were formerly commonly made in button sizes for watches, but due to careless disposal and the resulting mercury pollution hazard, they are no longer available. This is a concern for users of vintage camera equipment, which typically used a mercury button battery in the exposure meter for its very steady voltage characteristic.

Sizes are shown for the silver-oxide IEC number; types and capacity are identified as (L) for alkaline and (S) for silver-oxide. In some cases, sizes that originally were distinct are now interchangeable. For example, the 189/389 cell is 3.1 mm high and was designated 1131, while the 190/390 size is 3.0 mm high and was designated 1130, but these sizes are now considered equivalent.



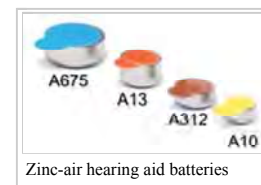
Assorted sizes of button and coin cells, including alkaline and silver oxide chemistries. Four rectangular 9 V batteries are also shown, for size comparison. Enlarge to see the button and coin cell size code markings.

Most common name	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Dimensions (mm) dia. × h.	Comments (L) = alkaline (S) = silver-oxide
SR41	AG3/SG3/G3-A LR41 192/384/392 6135-99-949-0402 (NSN)(S)	LR736 (L) SR736 (S)	1135SO (S) 1134SO (S)	25–32 (L) 38–45 (S)	7.9 × 3.6	
SR43	AG12/SG12 LR43 L1142 186/301/386 6135-99-547-0573 (NSN)(S)	LR1142 (L) SR1142 (S)	1133SO (S) 1132SO (S)	80 (L) 120–125 (S)	11.6 × 4.2	
SR44	AG13/SG13 LR44 /LR154 6135-99-792-8475 (NSN)(alkaline) 6135-99-651-3240 (NSN)(S) A76/S76/EPX76 157/303/357 1128MP, 208-904, A-76, A613, AG14, AG-14, CA18, CA19, CR44, D76A, G13A, G13-A, GDA76, GP76A, GPA7, GPA75, GPA76, GPS76A, KA, KA76, AG76, L1154, L1154C, L1154F, L1154G, L1154H, LR44G, LR44GD, LR44H, MS76H, PX76A, PX675A, RPX675, RW82, SB-F9, V13G, 357A	LR1154 (L) SR1154 (S)	1166A (L) 1107SO (S) 1131SOP (S)	110–150 (L) 170–200 (S)	11.6 × 5.4	Typical internal resistance: 8 ohms
SR45	AG9/SG9 LR45 194/394 6135-99-782-4675 (NSN)(S)	LR936 (L) SR936 (S)		48 (L) 55–70 (S)	9.5 × 3.6	
SR48	AG5/SG5 LR48 L750 193/309/393	LR754 (L) SR754 (S)	1136SO (S) 1137SO (S)	52 (L) 70 (S)	7.9 × 5.4	
SR54	AG10/SG10/G10-A LR54 189/387/389/390 LR1130/SR1130 6135-99-796-0471 (NSN)(S)	LR1131 (L) SR1131 (S)	1138SO (S)	44–68 (L) 80–86 (S)	11.6 × 3.1	
SR55	AG8/SG8 LR55 191/381/391 LR1120/SR1120	LR1121 (L) SR1121 (S)	1160SO (S)	40–42 (L) 55–67 (S)	11.6 × 2.1	
	365,366,S16,608	SR1116SW		28-40 ^{[25][26]}	11.6 × 1.65	1.55 V
SR57	AG7/SG7 LR57 195 395(low-drain)/399(high-drain) ^[27] LR927/SR927 SR927W/SR927SW/GR927 6135-99-796-0471 (NSN)(S)	LR926 (L) SR926 (S)	1165SO (S)	46 (L) 55–67 (S)	9.5 × 2.6	
SR58	AG11/SG11 LR58 162/361/362	LR721 (L) SR721 (S)	1158SO (S)	18–25 (L) 33–36 (S)	7.9 × 2.1	
SR59	AG2/SG2 LR59 196/396/397	LR726 (L) SR726 (S)	1163SO (S)	26 (L) 30 (S)	7.9 × 2.6	
SR60	AG1/SG1 LR60 164/364	LR621 (L) SR621 (S)	1175SO (S)	13 (L) 20 (S)	6.8 × 2.1	
SR63	AG0/SG0 LR63 379	LR521 (L) SR521 (S)		10 (L) 18 (S)	5.8 × 2.1	
SR64	LR64 319	LR527 (L) SR527 (S)		12 (L) 20 (S)	5.8 × 2.7	
SR65	SR616SW 321	LR65 Varta V321			6.8 × 1.65	
SR66	AG4/SG4 LR66	LR626 (L) SR626 (S)	1176SO (S)	12–18 (L) 26 (S)	6.8 × 2.6	

Most common name	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Dimensions (mm) dia. × h.	Comments (L) = alkaline (S) = silver-oxide
	177/376/377 SR626SW					
SR67	315	SR716 (S)		21 (S)	7.9 × 1.65	
SR68	SR916SW 373	LR916 (L) SR916 (S)		26 (S)	9.5 × 1.6	
SR69	AG6/SG6 LR69 171/371 LR920/SR920	LR921 (L) SR921 (S)		30 (L) 55 (S)	9.5 × 2.1	
SR416	SR416SW 337	LR416 (L) SR416 (S)		8 (S)	4.8 × 1.6	
SR516	SR516SW 317	LR516 (L) SR516 (S)		11 (S)	5.8 × 1.6	
SR712	SR712SW	SR712 (S)		9 (S)	7.9 × 1.3	
SR731	SR731SW 24 329	LR731 (L) SR731 (S)		36 (S)	7.9 × 3.1	
LR932		LR932 (L)		40 (L)	9.3 × 3.2	Rarely used independently. 8 of these in series used in A23 battery.

Zinc air cells (hearing aid)

Miniature zinc-air batteries are button cells that use oxygen in air as a reactant and have very high capacity for their size. Each cell needs around 1 cubic centimetre of air per minute at a 10 mA discharge rate. These cells are commonly used in hearing aids. A sealing tab keeps air out of the cell in storage; a few weeks after breaking the seal the electrolyte will dry out and the battery becomes unusable, regardless of use. Nominal voltage on discharge is 1.2 volts.



Zinc-air hearing aid batteries

Most common name	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Dimensions (mm) dia. × h.	Comments
5	AC5, ZA5	PR63	7012ZD	33	5.8 × 2.5	Marked as "discontinued" in Energizer data sheet ^[28]
10	yellow tab, ZA10 ^[29] ^[30]	PR70	7005ZD	91	5.8 × 3.6	
13	orange tab, ZA13	PR48	7000ZD	280	7.9 × 5.4	
312	brown tab 6135-99-752-3528 (NSN) ZA312	PR41	7002ZD	160	7.9 × 3.6	
675	blue tab, ZA675	PR44	7003ZD	600	11.6 × 5.4	
AC41E		PR43	7001Z	390	11.6 × 4.2	Discontinued

Lithium-Ion batteries (rechargeable)

Cylindrical lithium-ion rechargeable battery

Lithium-ion rechargeable batteries are generally not interchangeable with primary types using different chemistry, although certain sizes of lithium primary cells do have lithium-ion rechargeable equivalents. Most rechargeable cylindrical cells use a chemistry with a nominal voltage around 3.7 volts, but LiFePO₄ cells produce only 3.2 volts.

Lithium-ion cells are made in various sizes, often assembled into packs for portable equipment.^[31] Many types are also available with an internal protection circuit to prevent over-discharge and short-circuit damage. This can increase their physical length; for example, an 18650 is around 65 mm (2.6 in) long, but may be around 68 mm (2.7 in) long with an internal protection circuit. Safe and economic recharging requires use of chargers specified for these cells. Popular applications include laptop battery packs, electronic cigarettes, flashlights, electric vehicles, and cordless power tools.

Commonly-used designation numbers indicate the physical dimensions of the cylindrical cell, in a way similar to the system used for lithium button primary cells. The larger rechargeable cells are typically assigned five-digit numbers, where the first two digits are the (approximate) diameter in millimeters, followed by the last three digits indicating the (approximate) height in tenths of millimeters.



An 18650 size lithium ion battery, with an alkaline AA for scale




Most common name	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Dimensions (max.) dia. × l. (mm)	Comments
10180	Lithium Ion 1/3 AAA			90	10 × 18	Sometimes called 1/3 AAA. Used in tiny flashlights
10280	Lithium Ion 2/3 AAA			200	10 × 28	Used in small flashlights
10440	Lithium Ion AAA			340	10 × 44	Same size as AAA cell.
14250	Lithium Ion 1/2 AA			300	14 × 25	Same size as 1/2 AA cell. Used in the flashlight Lummi RAW
14430				400	14 × 43	Used in solar garden lights, used in rechargeable shavers (e.g., some Philips/Norelco).
14500 ^[32]	Lithium-ion AA			700–800 ^[33]	14 × 53	Same size as AA cell or longer if a protection circuit is included. Used in many LED flashlights. Some contain protections cells
14650				1600	14 × 65	
15270				450–600	15 × 27	Substitute for CR2 primary lithium. 3 V.
16340				500–1000	16 × 34	Alternate substitute for CR123A primary lithium. ^[34] Unprotected. (16 × 36, some protected versions ^[35]).
16650				1000–2700	16 × 65	Made by Sanyo and a few Others, narrower version of 18650 cells.
RCR123A	17340, R123, RCR123, 2/3A, Tenenergy 30200 ^[36]			750	17 × 34.5	Same size as, and substitute for, CR123 primary lithium for cameras and flashlights. Size 2/3A. Protected version.
17500 ^[37]	A			1100	17.3 × 50	The same size as an A cell, and 1.5 times the length of a CR123A.
17670 ^[38]				1250	17 × 67	2 times the length of a standard CR123A.
18350				700–1200	18 × 35 (nominal)	^[34]
18490				800–1300	18 x 49	
18500 ^[39]				1400	18.3 × 49.8	About the same length as an A cell, but larger diameter.
18650 ^[40]	168A			1500–3500	18.6 × 65.2	This cell type is used in many laptop computer batteries, the Tesla Model S, electronic cigarettes, ^[41] and LED flashlights. ^[34]
19670	Protected 18650 ^[42]			2200–3600	19 × 67	Correct designation of protected 18650 . ^[34]
21700	20650, 21-70			4200–4800	21 × 70	Announced by Samsung ^[43] and LG Chem in 2015 for electric bikes. ^[44] To be produced at Tesla Gigafactory 1 for Tesla Model 3. ^[45]
25500 ^[46]				2500–5000	24.3 × 49.2	About the same diameter as a C.
26650 ^[47]				3300–5200 ^[48]	26.5 × 65.4	Popular size as ^[49] ANR26650 LiFePO ₄ cell from A123 Systems for radio control hobby use.
32600 ^[50]				3000–6000	32 × 61.9	About the same diameter as a D cell but longer.
32650				5000–6000	32 × 67.7	Popular in larger LED flashlights.
75400				80 - 150	7.5 × 40	Used in some cheap E cigarettes.

Obsolete batteries

These types are no longer manufactured or only used in legacy applications.

Further information on obsolete batteries may be found on the web sites of the Clasic Radio Shop (<http://www.classicradioshop.info/valve-and-transistor-radio-batteries/>) in the UK and the Radiomuseum (<http://www.radiomuseum.org/>) in Switzerland.

Most common name / image	Other common names	IEC names	ANSI names	Typical capacity (mAh)	Nominal voltage (V)	Terminal layout	Dimensions (mm)	Comments
	PX21	3LR50	1306A	580 (alkaline)	4.5		D: 17.1 H: 49.9	Used in cameras and Apple Macintosh computers (such as the 128K through 512K and similar).
	PX19	3LR50	1307AP	580 (alkaline)	4.5		D: 17.1 H: 58.3	A 523 with snap connectors attached to either end. Used in some older cameras, notably the Polaroid Automatic Land Camera packfilm models.
	Ignition Cell, 6135-99-114-3446 (NSN) FLAG (in UK)	R40	905	35000–40000 (carbon–zinc)	1.5 V		D: 67 H: 172	Typical modern uses include school science experiments, and starting glow plug model engines. Still commonly used in the UK for remote level crossing telephone handsets, where solar cells and rechargeable batteries have not been specified or retrofitted. Formerly used for primary cell powered alarms (those without mains power) and associated bell ringing, servant or nursecall systems, ignition systems, telephones, ^[3] and (in pairs) in WWII US Navy battle lanterns. Modern cells are more likely to be Alkaline type made from 'D' cells. Terminals are screw posts with a maximum diameter of 4.2 mm. + centre, - edge.
	Eveready 742				1.5 V	Metal tabs	H: 101.6 L: 63.5 W: 63.5	used to provide power to the filament of a vacuum tube.
	Eveready 762-S				45 V	Threaded posts	H: 146 L: 104.8 W: 63.5	used to supply plate voltage in vintage vacuum tube equipment. Origin of the term "B+" for plate voltage power supplies. Multiple B batteries may be connected in series to provide voltages as high as 300V DC. Some version has several taps at 22.5 volt intervals.
	C Battery Eveready 761				1.5 to 9 V	Threaded posts or banana sockets	H: 76.2 L: 101.6 W: 31.75	originally used in vintage vacuum tube equipment for grid bias. Still popular for school science class use as a variable voltage supply as the current version has several taps at 1.5 volt intervals.
	Eveready 504 Mallory M154 NEDA 220 Rayovac 220	10F15 (Zn/MnO2)	220	65	15 V (10 cells)	Flat round (one each end)	H: 34.9 L: 15.1 W: 15.9	Used in older instruments ^[51] and old Battery-capacitor flashes. Only used in legacy applications, but as of 2016, still being manufactured.
	Eveready 412	15F20 (Zn/MnO2)	215	140	22.5 V (15 cells)	Flat round (one each end)	H: 50 L: 25 W: 15	Used in older instruments, ^[52] the Regency TR-1 (first transistor radio) and old Battery-capacitor flashes.
	Eveready 413	20F20 (Zn/MnO2)	210	140	30 V (20 cells)	Flat round (one each end)	H: 64 L: 25 W: 15	Used in older instruments ^[53]

30-volt 								
45-volt 	Eveready 415	30F20 (Zn/MnO ₂)	213	140	45 V (30 cells)	Both on same end	H: 91 L: 26 W: 15	Used in older instruments ^[54]
67½-volt 	Eveready 416		217	140	67.5 V (45 cells)	Both on same end	H: 88 L: 33 W: 25	Used in older instruments ^[55]

PP series

The PP (*Power Pack*) series was manufactured by Ever Ready in the UK (Eveready in the US). The series comprised multi-cell carbon-zinc batteries used for portable electronic devices. Most sizes are uncommon today, however the PP3 size (and to a lesser extent PP8 and PP9, which are used in electric fencing and marine applications respectively) is readily available.^{[56][57]} All types were rectangular, except the cylindrical PP4, and most had snap terminals as seen on the common PP3 type.



The PP battery range.

Image	PP series	Other common names	Typical capacity (mAh)	Nominal voltage (V)	Dimensions (mm)	Comments
	PP1			6	H 55.6 L 65.5 W 55.6	This battery had 2 snap connectors spaced 35.0 mm apart.
	PP3	<i>See 9-volt, above</i>				
	PP4	226 NEDA 1600 IEC 6F24		9	H 50.0 Diameter: 25.5	
	PP6	246 NEDA 1602 6135-99-628-2361 (NSN) IEC 6F50-2	850	9	H 70.0 L 36.0 W 34.5	Centre distance between terminals is max 12.95 mm with both offset 7 mm nominal from the wider battery edge. Mass is 120 g.
	PP7	266 NEDA 1605 6135-99-914-1778 (NSN) IEC 6F90	2500	9	H 63 L 46 W 46	Centre distance between terminals is max 19.2 mm. Mass is 200 g.
	PP8	SG8 "Fencer"		6	H 200.8 L 65.1 W 51.6	This battery typically had 2 snap connectors, however 4 connector versions are available. They were spaced 35.0 mm apart. This type of battery is sometimes used in electric fencing applications.
	PP9	276 NEDA 1603 6135-99-945-6814 (NSN) IEC 6F100	5000	9	H 81.0 L 66.0 W 52.0	This battery has 2 snap connectors spaced 35.0 mm apart.
	PP10			9	H 226.0 L 66.0 W 66.0	This battery had 2 pin connectors. They were a single Ø3.2 mm negative pin and a single Ø4.0 mm positive pin spaced 13.0 mm apart.
	PP11			4.5 + 4.5	H 91.3 L 65.1 W 52.4	This battery had 4 pin connectors. 9 V was available by wiring in series. There were two Ø3.2 mm negative pins spaced 9.5 mm apart and two Ø4.0 mm positive pins spaced 14.3 mm apart. Negative and positive pins were spaced 18.1 mm apart.

See also

- Battery holder
- Battery recycling
- Battery (vacuum tube)
- Comparison of battery types
- List of battery types
- Nine-volt battery
- Button cell



Wikimedia Commons has media related to ***Electric batteries***.

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Further reading

- IEC 60086-1: Primary batteries - Part 1: General
- IEC 60086-2: Primary batteries - Part 2: Physical and electrical specifications
- IEC 60086-3: Primary batteries - Part 3: Watch batteries
- IEC 60086-4: Primary batteries - Part 4: Safety of lithium batteries
- ANSI C18.1, Part 1 Portable Primary Cells and Batteries With Aqueous Electrolyte - General and Specifications
- ANSI C18.1, Part 2 Portable Primary Cells and Batteries With Aqueous Electrolyte Safety Standard
- ANSI C18.2, Part 1 Portable Rechargeable Cells and Batteries - General and Specifications
- ANSI C18.2, Part 2 Portable Rechargeable Cells and Batteries Safety Standard
- ANSI C18.3, Part 1 Portable lithium Primary Cells and Batteries - General and Specifications
- ANSI C18.3, Part 2 Portable lithium Primary Cells and Batteries Safety Standard
- MOD Defence Standard 61-017 The Selection and Introduction of Batteries and Fuel Cells for Service Use
- MOD Defence Standard 61-021 Generic Specification for Batteries

External links

- A growing list of battery equivalents and details. (<http://highfields-arc.com/beginner/gloss/batteryequiv.htm>) Courtesy of the Highfields Amateur Radio Club (Cardiff, UK).
- Duracell Technical OEM Data Sheets (<http://www.duracell.com/procell/en-US/technical-reference/data-specification-sheets.aspx>)
- Energizer/Eveready Data Sheets (<http://data.energizer.com/DataSheets.aspx>)
- Energizer/Eveready European Data Sheets (http://data.energizer.com/Europe/Europe_Datasheets.aspx)
- Energizer/Eveready Obsolete Battery Data Sheets (<http://www.batterycentralmall.com/Batteries/Eveready/Eveready.html>)
- Brand Neutral Drawings Of Common Batteries Based On ANSI C18-2007 (<http://www.batteryholders.org/>)
- EU Report on battery labelling (http://ec.europa.eu/environment/waste/batteries/pdf/battery_report.pdf)
- Batteries CROSS-REFERENCE INDEX (<http://www.va.gov/oal/docs/veterans/DALCcatalogBatteries.pdf>)

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Categories: Battery (electricity) | Electronics lists | Battery shapes

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