Panasonic ENERGY
Energy that changes the future.

Introduction to Lithium Primary Batteries Suitable for Automated External Defibrillators (AED)

1. Role of Defibrillators

In recent years, the increase in lifestyle-related diseases and the aging population have led to a rise in cardiovascular disease (CVD) cases, which is a serious issue. CVD can cause arrhythmias such as ventricular fibrillation and ventricular tachycardia, sometimes resulting in cardiac arrest.

Defibrillators are devices that deliver an electric shock to patients in cardiac arrest, eliminating ventricular fibrillation and restoring the heart's normal rhythm. The effectiveness of defibrillation decreases as the time from cardiac arrest to treatment increases, so rapid use is crucial.

2. Types of Defibrillators

Defibrillators are classified into implantable (internal) and external types. External defibrillators are further divided into semi-automated and automated external defibrillators (AEDs). The difference lies in whether the ECG analysis is initiated manually or automatically.

Semi-automated external defibrillators are used by medical professionals in hospitals or ambulances, typically requiring medical knowledge or certification to use. However, AEDs provide voice and screen instructions for life-saving procedures, making them easy to use even for those without medical training. Previously, all external defibrillators were semi-automated limiting their use to strictly medical professionals, but since the 2000s, many countries have eased regulations to allow public use by increasing installation of AEDs. Since cardiac arrest can occur anytime and anywhere, the expansion of AEDs has been extended to public places and locations where many people gather, such as schools, offices, commercial facilities, and transportation systems. This document focuses on AEDs and how Panasonic Energy Lithium Primary Batteries are a reliable power source for these life-saving machines.

Table 1. Types of Defibrillators

Type	Implantable Defibrillator (ICD)	External Defibrillator		
		Wearable Defibrillator	Semi-Automatic External Defibrillator	Automated External Defibrillator (AED)
Main Battery Used	Silver Vanadium Lithium Battery	Lithium-ion Battery		Lithium Primary Battery
Eligible Operators	Medical professionals only			Medical professionals & non-professionals
Installation Location	Implanted in patient	At home (worn by patient)	Medical institutions, ambulances	Schools, offices, commercial facilities, etc.

Table 2. Operating Procedures for AEDs/Semi-Automated External Defibrillators

Operation Step	Automated External Defibrillator (AED)	Semi-Automatic External Defibrillator
Electrode Pad Placement	Performed by operator (attach to right chest and left side)	
ECG Analysis	Starts automatically (every 2 minutes)	Starts at operator's discretion; ECG can be checked
Shock Decision	Automatically determined by device	
Shock Initiation	Operator presses shock button	
After shock, perform chest compressions and artificial respiration		

3. Battery Requirements for Automated External Defibrillators (AEDs)

Since AEDs are installed in various locations, they require a power supply without wiring and easy maintenance such as Lithium Primary Batteries. The requirements for batteries are as follows:

・High Reliability

AEDs are life-saving devices, so batteries with high reliability that can be used with certainty during rescue operations are required.

・Long Life

Since AEDs are installed in large numbers and frequent replacement is difficult, batteries that allow for longer replacement intervals are necessary.

・Wide Temperature Characteristics

As AEDs are often installed outdoors, batteries that can operate in various temperature environments are needed.

4. Panasonic Energy's Proposal for Batteries for AEDs

Panasonic Energy offers cylindrical lithium manganese dioxide batteries (CR123A) with high energy density and long-term usability, as shown in the table below.

【CR123A Specifications】

Nominal Voltage		3V
Nominal Capacity		1,550mAh
Continuous Standard Load		20mA
Dimensions	Diameter (max)	17.0mm
	Height (max)	34.5mm
Mass		Approx. 16.0g
Operating Temperature Range		-40℃ to +70℃

4-1. Long-Life and Wide Temperature Range Battery Cell

The CR123A achieves long life thanks to its excellent discharge characteristics. Figure 1 is a graph comparing the discharge capacity of initial CR123A cells and cells equivalent to 8 years of aging (calculated from accelerated testing at 70°C and 90% storage). At 2.0V, the 8-year equivalent cells maintain 83% of the discharge capacity of the initial cells, indicating minimal performance degradation.

Since the battery replacement interval for AEDs is generally 4 to 5 years, the CR123A is suitable for AED applications that require long battery life. Using long-life batteries eliminates the need for frequent replacements, which also helps improve the efficiency of maintenance operations.

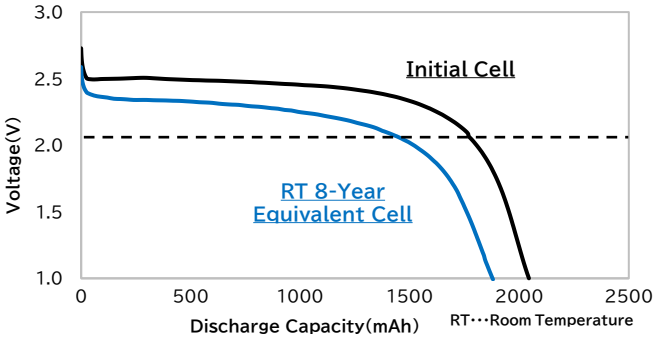

Figure 1. Standard Discharge Characteristics (CR123A)

Additionally, since AEDs regularly check the remaining battery level, they consume power even during periods of non-use. Therefore, when using AEDs, it is essential to ensure stable power supply by considering the amount of electricity consumed during these periodic battery checks throughout the installation period.

Currently, our company is developing improved CR123A cells with enhanced discharge characteristics in low-temperature environments. Figure 2 shows a graph of the pulse discharge characteristics at -20°C for the CR123A (under development) at 50% and 70% depth of discharge. Even in low-temperature environments where voltage tends to drop, the battery maintains a stable voltage of 1.5V or higher at both depths of discharge.

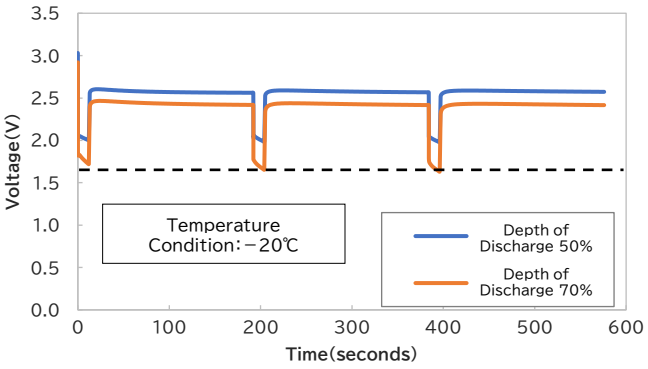

Figure 2. Pulse Discharge Characteristics (CR123A [under development])

4-2. Battery Packs Suitable for Use in AEDs

Generally, the power supply for AEDs uses battery packs that combine multiple single cells. The type and number of cells, the shape of the pack, and the components are determined according to the AED's specifications (voltage, load current), storage space, and usage conditions.

Panasonic Energy can design and manufacture custom battery packs suitable for AEDs according to customer requirements.

4-3. One Stop Solution

Panasonic Energy offers a wide lineup not only of lithium primary batteries for AEDs, but also secondary batteries such as lithium-ion batteries for semi-automated external defibrillators and wearable defibrillators. By integrating production from cell to pack, we achieve stable quality control.

We respond to various battery-related needs with our "One Stop Solution."

4-4. Stable Global Supply Chain

Panasonic Energy has multiple sites for securing battery materials and producing battery cells and packs, enabling us to deliver necessary products stably over long periods through an efficient and stable global supply chain.

Additionally, with sales offices worldwide, we can provide detailed local communication with our customers.

Panasonic Energy's business domains include batteries that support daily convenience and comfort, a wide range of social infrastructure, and the automotive industry including EVs. We contribute to realizing a sustainable society where a prosperous life and the environment are harmoniously balanced.

■For inquiries regarding this document, please contact us via the following link:

☛ Link to the contact page☚

The contents of this document are current as of September 2025. The values listed are not guaranteed values. Product specifications may be revised without notice.

■Product Details (Product Page Link)

CR123A - Primary Lithium Batteries - Panasonic Energy Co., Ltd.