# MISSION-CRITICAL

## Reliability and Cost-Effective Solutions for Data Centers

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C&D TECHNOLOGIES

PURE LEAD PLUS

**C&D Technologies, Inc. understands the importance of mission-critical applications and our customers' need for absolute reliability in their battery systems, and equally important: the most cost-effective solution possible. With that goal in mind, we strive to stay on the leading edge of the battery industry by developing new technologies and enhancing existing ones.**

### EFFICIENT OPERATION OF DATA CENTER ENERGY STORAGE

Lead-acid batteries have been a preferred method of ensuring power reliability for decades, backing up mission-critical facilities all over the world. As with any system, users are constantly looking for ways to improve on the technology to make it more cost effective and more efficient.

Early designs utilized flooded, or vented lead acid (VLA), type batteries that offered maximum reliability for these applications. Flooded batteries often stayed in service for 12-15 years or more, but came at a very high initial cost and required very specialized and time-consuming maintenance. Flooded batteries are still frequently used in existing facilities and applications where reliability is the most important characteristic of a battery such as utility and financial applications. Valve regulated lead acid (VRLA) batteries have become the industry standard in many newer applications, especially where footprint and reduced maintenance are priorities. VRLA batteries offer lower up-front costs due to the ability to be mass-produced and their more efficient use of lead, providing higher energy density over flooded designs. VRLA batteries also require less maintenance than flooded batteries. They are often referred to as "maintenance free" because they eliminate the need for watering and the level of expertise required for a visual inspection on flooded cells is also reduced.

### THE BENEFITS OF PURE LEAD FOR OPTIMIZING PERFORMANCE AND REDUCING COSTS

VRLA batteries, despite their cost savings, do have drawbacks. Early designs averaged three years in service before requiring replacement. Later design improvements increased that average lifespan to five years or more in many cases, but they require ideal conditions to meet that life.

One of the most critical factors in determining the lifespan of a lead-acid battery, especially VRLA, is ambient room temperature. Lead-acid battery life is typically rated at 20°C (68°F) to 25°C (77°F) depending on the region. Even 5-8 degrees of temperature rise over this results in the battery life expectancy being reduced by half, forcing data centers to install large cooling systems that run frequently. Many designers and operators have experimented with different ways to balance cooling costs and battery life to reduce overall operational costs of their facilities. An ambient temperature increase of just one degree can offer a utility cost savings of up to two percent, leading many operators to increase ambient temperatures and accept a reduction in battery life expectancy.

While data center operators looked for ways to cut operating costs, lead-acid battery manufacturers looked for ways to make batteries more resilient and longer lasting. Utilizing high purity lead in the manufacturing process has become an increasingly popular method of increasing battery life and offering higher temperature tolerance. This higher temperature tolerance can provide a drastic improvement of thermal management and at times reduce power used for cooling by as much as 25%. Using pure (virgin) lead to manufacture the battery grid helps to make the battery more resistant to one of the leading causes of battery failure – grid corrosion. By limiting the corrosion inside each cell, VRLA batteries could achieve a longer life, even at temperatures above 25°C (77°F).

### PURE LEAD GOES BEYOND THE GRID

The other key lead component inside of a lead-acid battery is the active material, or paste. The paste is responsible for the reaction that occurs in a lead-acid battery and dictates many characteristics of the cell including high-rate discharge capability, cycle service capability and float current requirements. By using pure lead to produce the active material in a lead-acid battery, the float current required to keep a cell fully charged can be reduced, limiting the amount of heat generated during charging and the amount of corrosion produced while on float charge. This further extends the life expectancy of the battery and allows data center operators to push ambient temperatures higher to save operating costs while still maintaining five plus years of life from their battery.

> **"WITH PURE LEAD IN THE PASTE, LEAD-ACID BATTERY LIFE IS EXTENDED ALLOWING DATA CENTERS TO INCREASE AMBIENT TEMPERATURES AND STILL MAINTAIN 5+ YEARS OF BATTERY LIFE."**

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The resulting cells built using pure lead raw materials provide a longer and more stable service life. The enhanced stability allows data center operators one more opportunity for cost savings – the use of a smaller battery. Traditionally uninterrupted power supply (UPS) systems were designed with fifteen minutes of reserve time to ensure safe transfer in the event of a power outage. In many cases, five minutes is ample time to allow a safe transfer, but because lead-acid batteries become less predictable towards end of life, large safety factors were built into the design of these systems.

By using high-purity materials, in both the grids and the paste, that limit or eliminate corrosion as a failure mode, the cells become more predictable near end of life and systems can be designed with reserve time closer to what is truly required. The reduction of these safety factors allows operators to use a smaller battery when designing around pure lead cells, which can help to offset the higher initial cost of this technology.

## THE C&D ADVANTAGE

Learn more about improvements in lead-acid battery technologies and how battery designs by C&D Technologies, Inc. help users reduce the cost of their standby power systems by visiting:

**https://cdtechno.com/the-cd-advantage/**

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