

Battery technology moves from power stations to the open road



O A A T A C C O M P L I S H M E N T S

Valve-Regulated Lead Acid Battery

Challenge

Technology developed for one use may sometimes be applied successfully in another. The U.S. Department of Energy first sponsored research on the valve-regulated lead acid (VRLA) as an energy storage device for electric utilities. To ensure uninterrupted electrical power during peak periods, utility companies store energy during periods of lower demand. The high-performance, long-lived, low-maintenance VRLA battery is an ideal choice for this purpose. Now this technology is being applied to electric vehicles.



Valve-regulated lead acid battery.

Technology Description

The sealed VRLA battery is a closed system in which the quantity of electrolyte is limited, but the gases resulting from energy production are recombined to be reused instead of being released to the atmosphere. Because the electrolyte is recycled, there is no need to add water to the batteries. Excess gas pressure that may build up inside the battery is released through a simple regulating valve to ensure that structural integrity is not compromised.

Accomplishments

- The VRLA battery concept was developed and rigorously tested to confirm performance. These tests demonstrated the effectiveness of the valve-regulated concept compared with flooded, vented cells. When tested in large modules and packs, VRLA batteries showed excellent performance.
- VRLA batteries were adapted for use in prototype and early limited-production electric vehicles in the late 1980s and early 1990s because of their low maintenance and availability. This application facilitated field demonstrations and electric vehicle sales.

Commercialization

- The VRLA concept has been adopted by industry and widely commercialized in a variety of applications. The U.S. lead acid battery industry continues to maintain a strong position in this technology.
- VRLA batteries were introduced in automobiles in 1978 for starting, lighting, and ignition.

Benefits

- The relatively low cost of VRLA batteries reduced the cost of electric vehicles, which is helping introduce markets where range limitation is not a problem.
- The electrode materials and thermoplastic case of VRLA batteries can be completely recycled with current technology.

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Future Activities

The industry will continue to use VRLA batteries for appropriate applications.

Partners in Success

- Argonne National Laboratory
- Exide Technologies
- Johnson Controls
- Sandia National Laboratories

