

SEALED LEAD-ACID BATTERIES

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The objective was to develop a maintenance-free, 6-V, 100-A h, lead-acid battery for deep discharge applications. The design was an extension of existing technology including starved electrolyte, permitting the battery to operate in any position, and sealed cells with recombination of gases making it totally maintenance free.

Studies conducted by Eagle-Picher included (1) cycling tests using both the standard and PSOC routines and both vertical and horizontal orientation; (2) various combinations of glass and microporous separators; (3) expanded versus cast Pb-Ca grids; (4) the effect of various ratios of positive to negative material on recombination; (5) use of tetrabasic lead sulfate in place of conventional lead oxide. The final battery design incorporated the following features:

- Horizontal plate orientation,
- Fiberglass/polyethylene film separator,
- Expanded Pb-Ca grid,
- 4 to 5 pressure valves,
- Excess negative active material, and
- Lucite case and cover.

Batteries were delivered to SNL quarterly during the contract. The first three groups gave relatively short cycle life, developing weak or shorted cells. However, one commercial EP 'Carefree' battery gave 884 partial-state-of-charge cycles before failing due to water loss. The last group of three batteries, based on the final design above, will soon be tested.

Work on this contract was completed in December 1982.

Recent publications

- 1 C. Farris and E. S. Carr, A maintenance-free, 100 ampere-hour, lead-acid battery for deep discharge, photovoltaic applications, Eagle-Picher Industries, SAND82-7060, June 1982.