



Sealing Solutions for Energy Storage Systems

Optimal Sealing Performance in Critical Environments



ENGINEERING YOUR SUCCESS.

Optimal Performance

Sealing solutions for energy storage/flow batteries

Battery storage technology is the bedrock of renewable energy expansion. It provides a critical link between the intermittent generation of power from renewable sources like solar and wind and the consistent demand from consumers. Battery energy storage systems capture and store energy, releasing it when the need for power is at its peak.

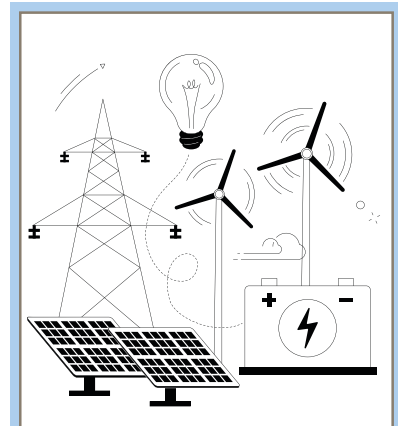
The reliability, output, and density of large-scale battery systems have seen a significant boost due to breakthroughs in technology and materials. These advances are driving continuous innovation, fine-tuning the performance of battery technology, and contributing to the development of a more resilient and flexible energy grid.

Situated near renewable energy sources, such as solar farms in remote desert areas, battery systems rely heavily on high-performance sealing technology. This technology is key to shielding the battery systems from extreme weather conditions and temperatures, thereby ensuring their efficient operation. It underscores the importance of robust protective measures in the successful implementation of renewable energy solutions.

Parkers O-Ring & Engineered Seals (OES) Division provides sealing solutions for energy storage systems and flow batteries. Parker application engineers can provide solutions to meet the unique customer requirements for end users. Each flow has unique chemistry and enclosure requirements making custom sealing paramount.

Design Considerations

- 1. Low Sealing Force** – many battery applications use plastics. A solid seal can easily deform manufacturers hardware. Having a hollow or low closure force seal can help overcome this challenge
- 2. Retention** – seal retention in the groove can be important as the battery is manufactured. Batteries moved station to station could easily lose seals or make for unsafe manufacturing practices and the stacks are assembled. Seals that retain into the groove allow for ergonomically friendly and reliable manufacturing.
- 3. Automation** – a flow battery is comprised of many plates stacked on top of each other. Installing seals manually can be a very time consuming and costly process. By using a Parker cure in place solution can help automate the process reduce tact times and cost.



Material Selection

When selecting a material for flow batteries, it is important to think about the flammability of the seals. Fires can be a concern when designing a battery. Having a UL94 rated material can stop the spread of a fire in the battery.

Flow battery chemistries also provide a demanding sealing environment. Parker materials team can review a customer specific chemistry to help make a material recommendation.



Energy Storage Systems & Flow Battery Applications

1. Cell Stack

Stack sealing is critical seal to allow the transfer of electrons through membranes to produce energy. PIP is a great homogeneous rubber option to seal a complex groove path with very little room for a groove. For a more automated solution, Cure In Place gasket can be used. This allows for a more efficient manufacturing while providing a sufficient seal.

Options: PIP, CIPG, overmolded carrier gaskets

2. Electronics/Controller Housing

Electronics are key to keep protected for the energy storage market. Key design criteria are retention and closure force. A custom designed enclosure seal can be designed to provide a seal to meet challenging grooves and closure force requirements.

Options: Parfab, custom molded seals, O-Rings, lathe cuts

3. Tanks, Pumps, Tubing Sealing

The pumps, tubing, fittings used for the flow of electrolyzer in a flow battery. It is key to keep these systems seal to prevent contamination and sealed to efficient batteries and loss of electrolyzer. These seals could be a basic O ring to custom grommets. Please reach out to an application engineer to have the correct seal selected for your application.

Options: O-rings, custom molded seals, lathe cuts





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