

# Deka® High Rate HRC

## DEKA HRC – COMPU-PRESS™

# Technology for Critical Power



There is a real need in the data center marketplace for a line of quality high rate batteries that are sustainable and economical while providing peak performance and life. Seeing that need, East Penn Manufacturing created the Deka HRC product line with three key design features for high rate critical power applications. **Those key features are Engineered Alloys, Compu-Press Grids, and Hydro Formation.**

### WHAT ARE ENGINEERED ALLOYS?

Before a battery grid is even created, a decision must be made on the raw materials. Most battery companies use a lead alloy with a concentration of lead close to 99%. Despite the novel buzz words which fill the market like “Pure Lead” or “Thin Plate Pure Lead (TPPL)”, pure lead has been around for a long time, and by itself, is not particularly beneficial to the end-user. A battery with 100% pure lead can impede charge acceptance through the gradual buildup of a passivation layer, affecting the mass-to-grid interface<sup>1,2</sup>. What is most beneficial is an engineered blend of lead and alloys to match the battery’s intended service needs.

Based on industry papers, research, and results, optimized performance in high rate applications occurs with a perfected mixture of pure lead with tin and calcium alloys,<sup>2,3,4</sup> not solely with just pure lead. It’s a composition East Penn has been building into its premium line Deka High

Rate batteries for decades, and it’s an integral part of the new Deka HRC. East Penn uses an engineered alloy formula with high lead purity, specifically tailored to meet the proper high-rate application that improves the mass-to-grid interface’s conductivity. An enhanced mass-to-grid interface allows for greater adhesion and uniformity of active material contact, optimizing the battery’s power delivery and improving life compared to a strictly pure lead/TPPL battery. East Penn’s engineered alloy also provides increased corrosion tolerance, conductive performance, manufacturing consistency, and proven performance that a single pure lead and TPPL grid solution can’t match.

### WHAT IS COMPU-PRESS™?

Compu-Press is an exclusive process that produces an optimized battery grid ideal for high rate applications. The core of this proven process is rolling metal to enhance its strength beyond its original state. Compu-Press casts a thick, con-

tinuous solid sheet of engineered alloyed lead, and rolls it under multiple stages of extreme pressure, and compresses that sheet down to a computer-controlled optimally designed thickness. Once compressed, it is ultimately perforated into a highly compacted, robust grid. It is similar to a cold-rolled steel process, which is used for more technically precise applications. In terms of physical characteristics, cold-rolled steels are typically harder and stronger than standard hot-rolled steels. As the metal is shaped at the lower temperatures, the steel’s hardness, resistance against tension breaking, and resistance against deformation is increased<sup>5</sup>.

East Penn’s exclusive Compu-Press process, in combination with our engineered alloy formula, produces the highest quality grids, featuring an excellent combination of mechanical properties such as improved tensile strength, shear strength, toughness, and hardness. Compared to pure lead/TPPL, lead alloyed with high tin, and low calcium is

**The beneficial effects of high tin on positive-grid corrosion in VRLA batteries improve corrosion resistance because of the large number of fine precipitate particles and better accommodation of the stresses of corrosion by the high mechanical properties of the alloys.<sup>4</sup>**

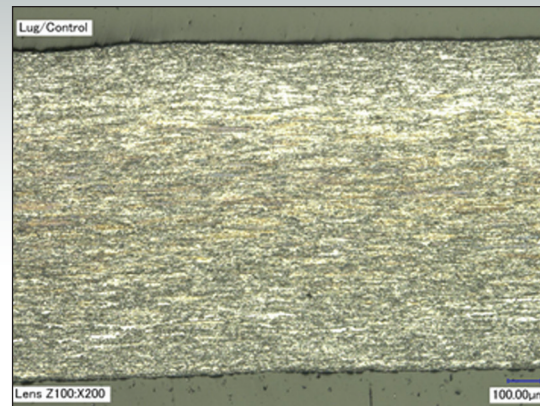
— R. DAVID PRENGAMAN

over 390% stronger in Ultimate Tensile Strength. This increased strength helps prevent active material shedding.

The Compu-Press process changes the original materials' morphology into a homogenous grain structure, solidifying it for high rate performance rigors. A finished Compu-Press grid creates an elongated grain structure with a visual appearance similar to layers of armor (Fig. 1). The outer layers limit the electrolytes path to the grid's outer surface, protecting the grid's inner layers and core. Should corrosion affect the outer layer, there are multiple layers of protection still in place.

As with any lead battery, corrosion of the grid by the electrolyte occurs along the grain boundary edges. With its horizontal layers of armor, any pathways for the electrolyte to penetrate the Compu-Press grid grain boundary edges are similar to a labyrinth, making it virtually impassable.

East Penn has over a decade of expertise and has produced over 256 million batteries utilizing the Compu-Press process. The results from this process have significantly exceeded the company's performance expectations.



(Fig. 1)

**WHAT IS HYDRO-FORMATION?**

After the grids are created and pasted with our proprietary lead-oxide paste, they become plates. After plates are cured using exacting methods, they are inserted into battery cases, assembled, and are ready for our Hydro-Formation. As a manufacturing process, the formation step is critical to provide the battery energy for long life and performance. As is common practice, the step of formation involves forming out the battery plates with high amounts of electricity, producing large amounts of heat as a byproduct. Formation is also a very carefully calculated process that takes a prescribed amount of time. East Penn uses a highly technical computer-controlled process of chilled water-assisted formation through its proprietary Hydro-Formation process.

Hydro-Formation enables a more consistent and efficient formation of the entire battery by controlling its overall temperature throughout the entire process, resulting in significant productivity efficiencies and energy savings.

**WHAT IS THE VALUE EQUATION?**

Through these key features, Deka HRC batteries offer peak performance, while leveraging your capital investment. It is another offering in the proven line of Deka products, including the revolutionary Deka Fahrenheit for high heat environments and the Deka High Rate, built to provide superior performance in critical applications. Additionally, all Deka batteries, including the new Deka HRC are virtually 100% sustainable and offer a financial credit when they reach end of life. Compared to alternative technologies such as lithium, Deka batteries provide high reliability and the lowest overall Total Cost of Ownership (TCO).

**CHOOSE A COMPANY YOU CAN TRUST**

With 75 years in the industry, and a known track record of performance, sustainability, and continued capital investment, East Penn makes batteries that work and consistently perform at the top of industry needs. Incorporating our proven Engineered Alloys, Compu-Press, and Hydro Formation technologies into our Reserve Power line gives customers with critical power applications, another reason to demand Deka.

**SOURCES:**

- 1- The Story of "Pure Lead." Fact, Fiction or Fairy Tale Fable (EPM #2479)
- 2- Pure lead and the tin effect in deep-cycling lead/acid battery applications, Journal of Power Sources, Authors: Robert F. Nelson and David M. Wisdom.
- 3- Mechanism of Action of Sn on the Passivation Phenomena in the Lead-Acid Battery Positive Plate, Dipartimento di Scienza dei Materiali e Ingegneria Chimica, Politecnico di Torino, Italy, Authors: M. Maja and N. Penazzi
- 4- The Impact of ALABC Research Results on Battery Design, The Battery Man, Author: R. David Prengaman, RSR Technologies
- 5- Hot Rolled vs. Cold Rolled Steel Blog - reliancefoundry.com



e-mail: [reservepowersales@dekabatteries.com](mailto:reservepowersales@dekabatteries.com)



East Penn Manufacturing Co.

Lyon Station, PA 19536-0147

Phone: 610-682-3263

Fax: 610-682-0891

[www.dekabatteries.com](http://www.dekabatteries.com)

E.P.M. Form No. 2567 01/21

© 2021 by EPM Printed in U.S.A.

All data subject to change without notice. No part of this document may be copied or reproduced, electronically or mechanically, without written permission from the company.