

FNC®

Battery systems



Motive Power Systems

Reserve Power Systems

Special Power Systems

Service

Your advantages with HOPPECKE FNC® battery systems

- **Reliable energy supply** - due to extremely high cycle stability
- **Long service life** - due to the HOPPECKE quality standard
- **Maximum safety** - through superior technology
- **Temperature resistant** - best properties under extreme temperature conditions
- **Low follow-up costs** - due to long maintenance intervals

Typical areas of application

- Internal power supply or starter battery in rail vehicles
- Automated guided vehicles
- Emergency power supply
- Engine start
- Storage of regenerative energy



 **HOPPECKE**
POWER FROM INNOVATION

Unique, world-wide

The HOPPECKE FNC® technology

In 1983, HOPPECKE introduced a nickel-cadmium battery, which is unique to date: the fibre structure technology, in short FNC® technology.

This dense three-dimensional fleece structure was originally designed for such demanding applications as aviation and aerospace and electric and hybrid vehicles. The key features, when compared to other technologies are:

- Discharge and charge allow high to very high currents
- It requires only a small nominal capacity for high currents
- Simultaneously, the volume and weight savings are significant

REDUCE YOUR COSTS BY USING THE FNC® TECHNOLOGY!

Throughout the entire service life of the batteries, there is no oxidation of graphite or formation of carbonate in the electrolytes. The consequence: the electrodes do not age. In contrast to conventional NiCd batteries, during the entire life of the batteries, replacement of the electrolyte is not required.

HOPPECKE ELECTRODES „MADE IN GERMANY“

All electrodes of the HOPPECKE FNC® cells are exclusively produced at the German plant in Brilon, which is ISO 9001, ISO 14001, IRIS and EN 15085 certified.

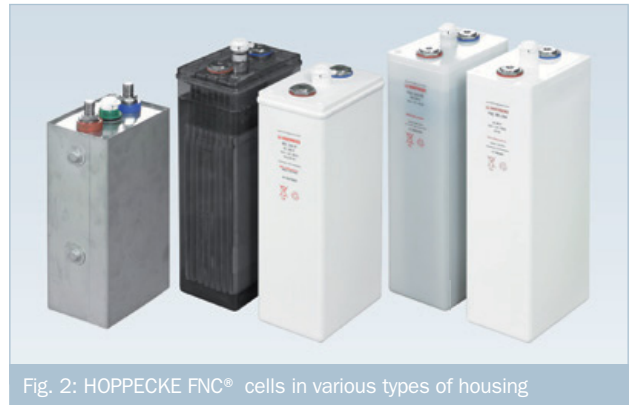


Fig. 2: HOPPECKE FNC® cells in various types of housing

THE FNC® ADVANTAGES AT A GLANCE

- Advanced battery technology for high demands
- Long service life and life-cycles, even under extreme temperature conditions
- Wide product range in the area of high energy density or of high power density for optimal adjustment of the battery to the customers' needs
- Fulfils the highest demands for shock and vibration resistance

The FNC® cells can be operated reliably in a temperature range from -20 to +50 °C. Using a special electrolyte, temperatures of even -50 °C to +70 °C are possible.

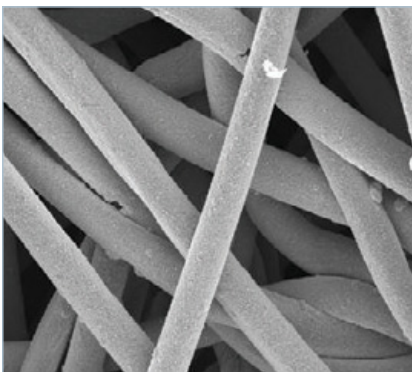


Fig. 1: The fibre structure: light, flexible and can be filled with up to 90% active material



The FNC® Technology has proven itself in the most extreme temperature

Powerful and economical

The HOPPECKE FNC® cells

OVER 6,000,000 TIMES PROVEN: THE HOPPECKE FNC® CELLS

More than 6,000,000 FNC® cells have already been delivered by us world-wide. Among other things, for automatic guided vehicles - an area where the world market leader is HOPPECKE. Your benefits at a glance:

- Best characteristics when in operation under extreme temperature conditions
- High cycle stability
- No need to change electrolyte
- Low water usage
- Low maintenance costs due to long maintenance intervals

SYSTEM SOLUTIONS WITH HOPPECKE FNC®

Precisely tailored to your needs, we design customised, turnkey battery systems.

- Train and metro systems, including the associated infrastructure
- Forklifts
- Automatic guided vehicles
- Electric buses
- Hybrid vehicles
- Stationary industrial applications
- Storage of regenerative energy

Our turnkey energy systems consist of

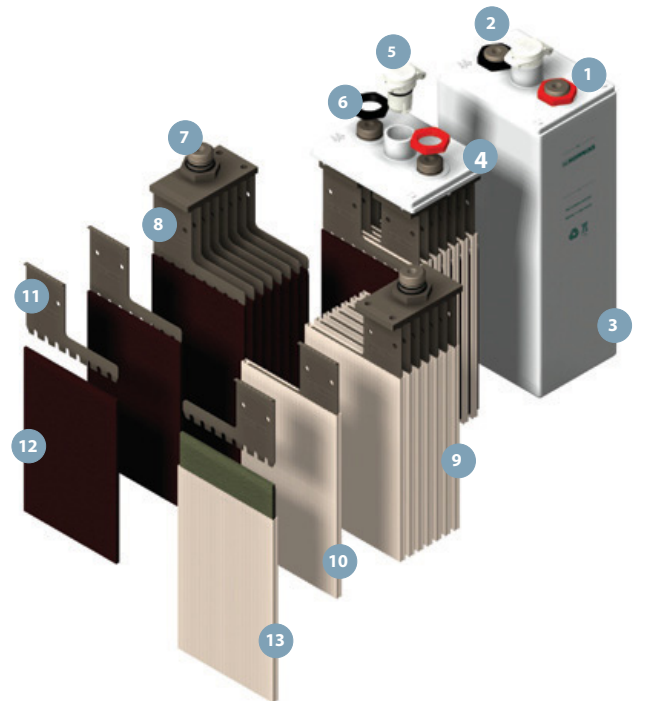
- Batteries
- Racks, cabinets, beams, troughs, boxes
- Chargers
- Electronic components (fuses, switches, diodes)

Already in the early stages of the project, we provide our clients with 2D drawings and 3D models in standard exchange formats. To verify the design of the battery system we carry out strength calculations - finite elements analyses - and if necessary also thermal analyses.

VERSATILE SOLUTIONS FOR YOUR REQUIREMENTS

HOPPECKE battery systems offer besides polypropylene cells as a standard solution also cells made from four other materials: Stainless steel, polyether sulphone VO (PES), polyamide VO und polypropylene VO.

DESIGN OF THE FNC® CELL



- | | | |
|---------------------|-----------------------------|--|
| 1 Positive terminal | 6 Terminal nut | 10 Positive fibre structure electrode with separator |
| 2 Negative terminal | 7 Cell terminal | 11 Lug |
| 3 Cell box | 8 Negative electrode packet | 12 Negative fibre structure electrode |
| 4 Cell over | 9 Positive electrode packet | 13 Separator |
| 5 Plug | | |

The development and manufacture of special solutions has been our area of expertise for many years. FNC®-fibre structure is an excellent technology for the production of special formats. We are happy to transform your individual requirements into reality as well.

THE HOPPECKE RECYCLING CONCEPT

We guarantee our customers that we will take back their used nickel-cadmium batteries - regardless of the technology, the manufacturer, or age of the batteries. For this, we have developed and implemented our own recycling concept.



Motive Power Systems



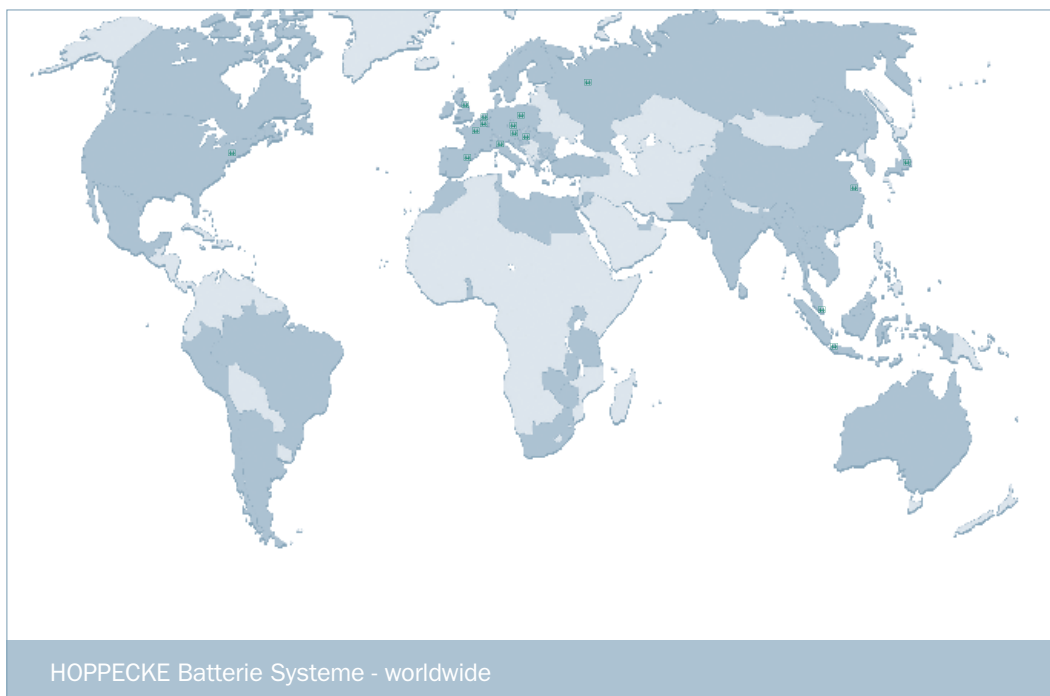
Reserve Power Systems



Special Power Systems



Service



HOPPECKE Batterie Systeme - worldwide

Industrial batteries - Complete energy systems - Full Service

- Low-maintenance and no-maintenance batteries
- Innovative battery chargers based on the latest technology
- Battery accessories
- Battery management systems and software
- Battery changeover systems
- Battery/charger servicing
- Battery recycling
- Applications engineering and technology
- Battery room design
- Technical training and seminars
- Leasing
- Energy sales

Your partner for sustainable energy

Further information visit: www.hoppecke.com

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