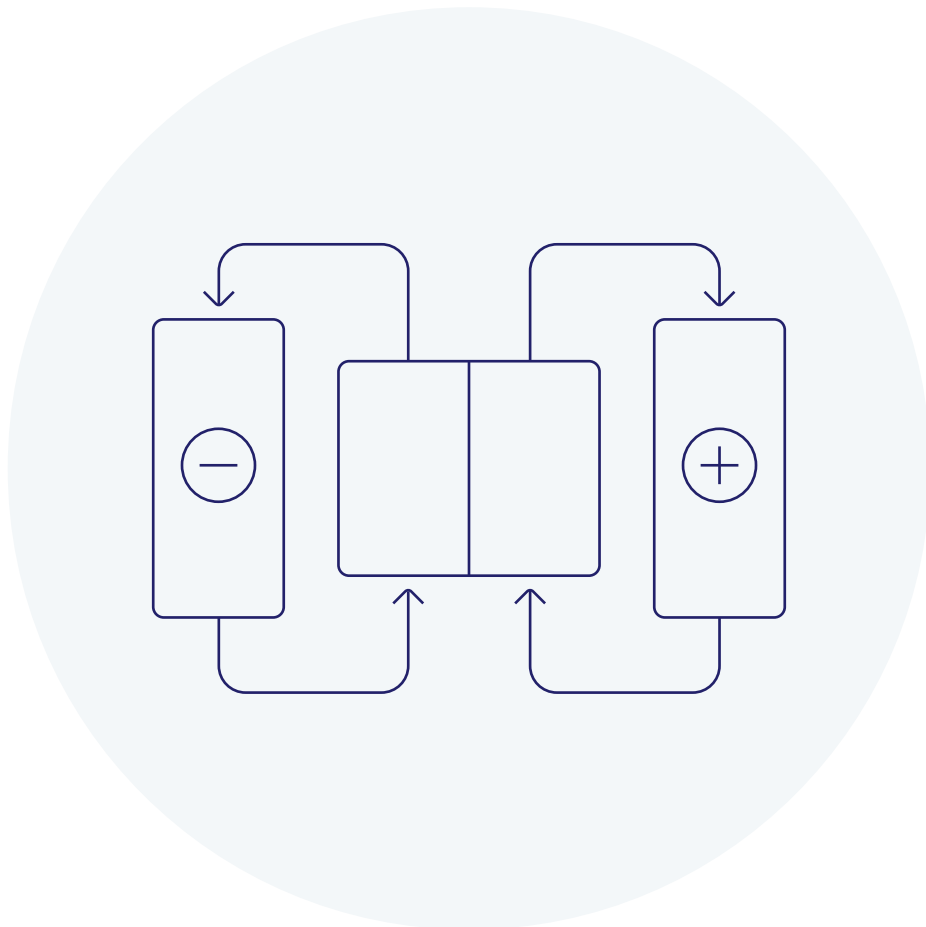


FLOW BATTERIES

CUSTOMISED SOLUTIONS BASED ON
POLYURETHANE, EPOXY AND SILICONE





NEW POSSIBILITIES FOR REDOX FLOW BATTERIES

The increasing use of renewable energy means that more and more electricity being generated – whether by large wind and solar farms or by small and medium-sized privately owned PV installations – needs to be temporarily stored locally.

Since the lithium-ion batteries frequently used for this purpose suffer from a number of disadvantages – among other things their poor ability to store energy over prolonged periods of time and the loss of capacity at low temperatures or over the course of use – alternative technologies are being developed. Redox flow batteries (commonly known as flow batteries) have already been used for many years for this purpose.

Flow batteries are elaborately constructed liquid batteries in which electrolytes, often based on vanadium, are circulated by means of pumps. Energy conversion takes place in an electrochemical cell that is separated into two halves by a membrane.

Like in fuel cells, the individual cells can be combined in series to create a “cell stack” that typically comprises flow frames, bipolar plates, electrode felts and gaskets.

To advance their technological progress and the scaling of their production, Wevo has developed special adhesives, sealants and encapsulants based on polyurethane, epoxy and silicone.

CHEMICAL-RESISTANT WEVO MATERIALS

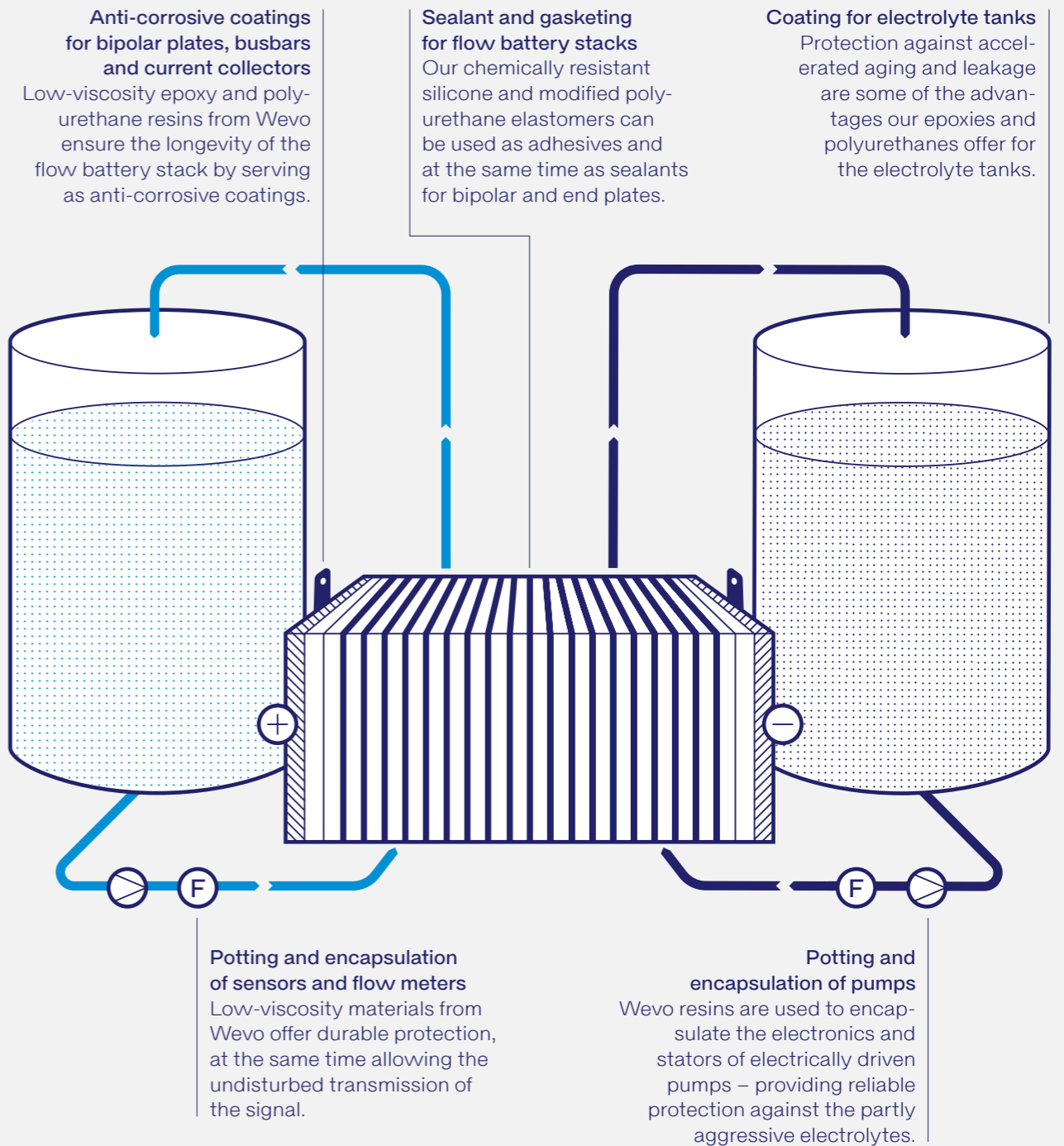
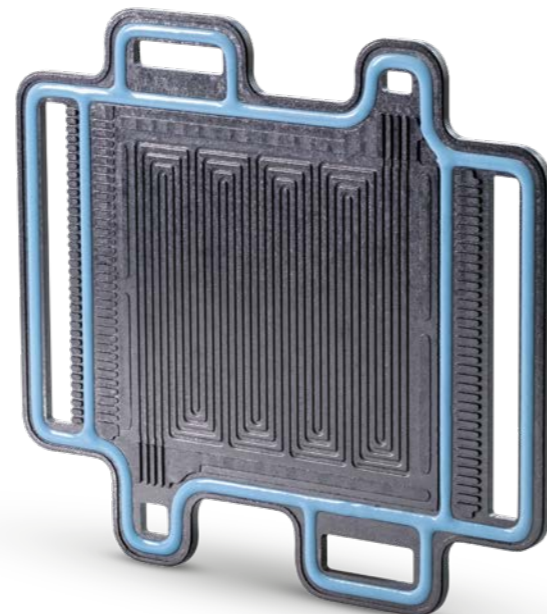
New production technologies for the stack assembly are playing an essential role in the industrialisation and scaling of the production of redox flow batteries.

Instead of using preformed gaskets and manually assembling the stack by using threaded rods or clamping rings, the use of adhesive joining technologies and liquid formed in place gaskets (FIPG) offers new possibilities and design freedom in terms of stack development and construction. The materials are either applied by dispensing or by the even faster screen-printing process and therefore allow the use of simplified and automatised production technologies.

These 2-component reactive materials do not release any volatiles or by-products during curing and are free of PFAS (per- and polyfluorinated alkyl substances).

Our low-viscosity materials can also be used to either partly or fully encapsulate the stack and to fix the individual cells.

Bipolar plate made of a graphite-polymer compound consisting of two monopolar plates that have been bonded and sealed with WEVOSIL 28001 A/B



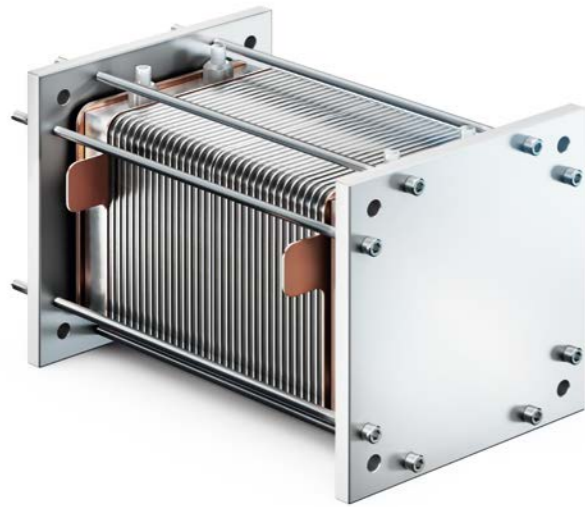
OTHER APPLICATIONS

Full or partial stack encapsulation
Our chemically resistant epoxy and polyurethane potting compounds can be used to fully or partially encapsulate flow battery stacks and therefore ensure leakage-free operation, e.g. in flow batteries for home storage.

Potting and encapsulation of power electronics and other BOP components
Our thermally conductive potting materials and thermal interface materials enable smooth heat dissipation and prolong component lifetimes.

CHALLENGES AND SOLUTIONS





The manner in which you use and the purpose to which you put and utilise our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether our products, technical assistance and information are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale which are available upon request. All information, in particular all technical data and assistance, is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance and information. Any statement or recommendation not contained herein is unauthorised and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with any claim of any patent relative to any material or its use. No licence is implied or in fact granted under the claims of any patent. Copyright 2024 WEVO-CHEMIE GmbH. All rights reserved. Unless otherwise indicated by name, all texts, images and graphics are subject to copyright and other laws for the protection of intellectual property. They may not be copied, changed or used in any other way.



Designing these battery stacks has been a challenge, as the partly aggressive electrolytes may lead to the accelerated decomposition of polymer materials, e.g. the gaskets and sealants. If the sealing material is chemically not resistant enough, it can either swell or degrade and lead to undesired leakages of the stacks and the entire battery assembly.

Potting and sealing compounds from Wevo withstand the conditions caused by the partly very aggressive electrolyte used in flow batteries. Especially the highly aggressive vanadium-containing sulfuric acid electrolyte used in vanadium flow batteries, one of the most widely deployed types of flow battery, causes very high stress on polymer materials.

PROPERTIES OF WEVO RESINS

-  Curing at room temperature or by heat/infrared
-  No by-products and VOC release while curing
-  Applied by dispensing or screen printing
-  PFAS- and fluorine-free

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