

ADHESIVES AND  
SEALANTS  
for fuel cells



# Fast. Precise. Efficient.

Accelerate net-zero mobility with  
adhesives and sealants for fuel cells

Achieving carbon neutrality by 2050 and limiting the effects of global warming are declared goals of the 2015 Paris Agreement. Net-zero mobility is crucial for this goal. Thus, hydrogen is becoming increasingly important as an alternative to battery-electric drivetrains, especially in the transportation sector. Here, fuel cell vehicles (FCVs) can offer fast refueling, long ranges, and high payloads.

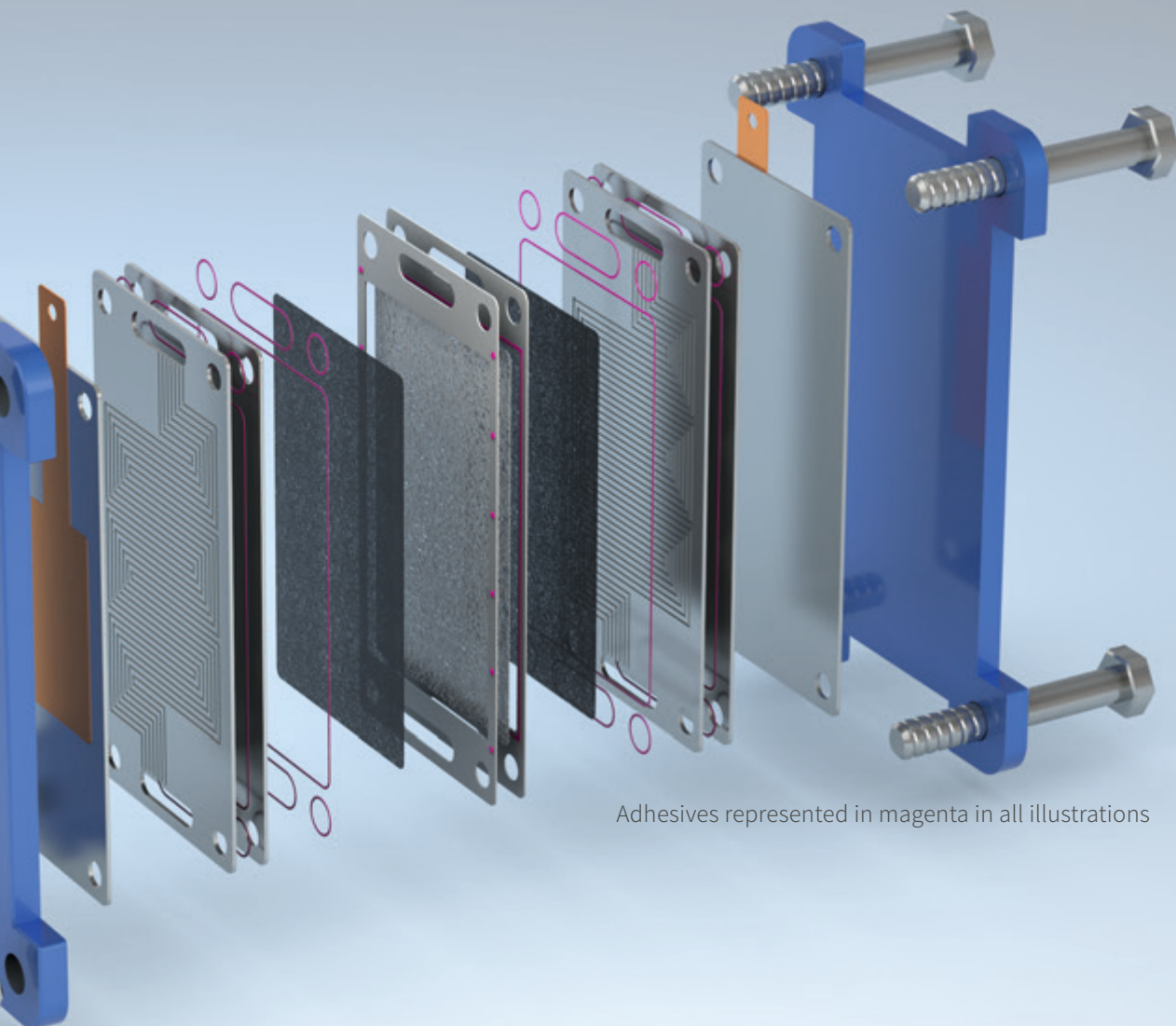
DELO's adhesives offer **efficient** and **tailored** solutions for key fuel cell applications such as bipolar plate bonding, stack sealing and gas diffusion layer fixation. Our products ensure high performance and reliability throughout their life cycle. Therefore, our adhesives target long-distance and heavy-duty vehicles such as trucks, as well as marine, rail, and air transportation.

DELO light-curing or preactivated adhesives and sealants are optimized for **fast, precise**, and fully automated production, ensuring maximum production **efficiency** while reducing energy consumption compared to thermal curing methods, for example. They have already been successfully implemented in sustainable mobility solutions, including electric motors or lithium-ion batteries.



Discuss your project and your requirements  
with our experts:

[esc-experts@DELO.de](mailto:esc-experts@DELO.de)



Adhesives represented in magenta in all illustrations

## Your benefits at a glance:



› Short cycle times



› Customized products  
for most precise  
bonding solutions



› Comprehensive  
process knowledge

# Diverse applications featuring multiple functions

DELO adhesives are used in three key bonding areas within fuel cells: connecting and sealing bipolar plate half-shells, sealing of media circuits inside the stack to each other and to the outside, and gas diffusion layer fixation.

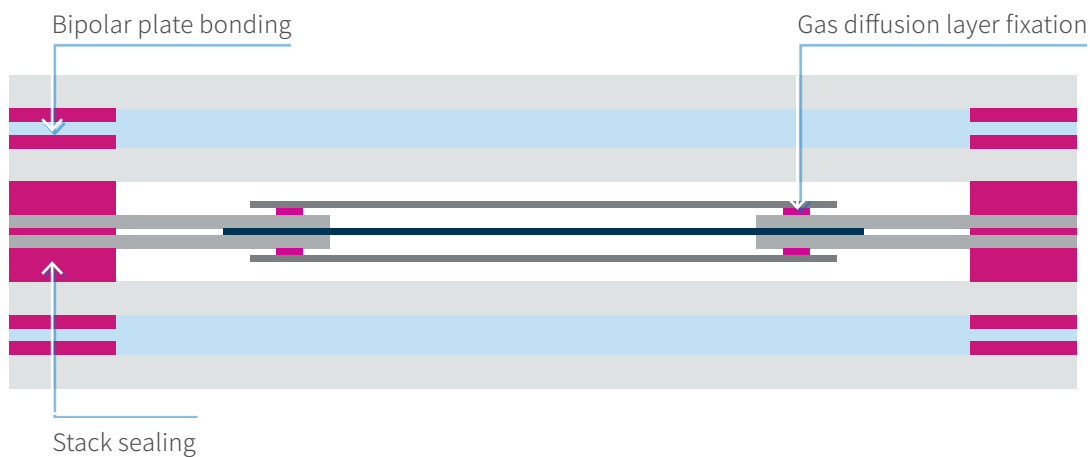
Our light-curing and preactivated adhesives are optimized for precise, automated production, using less energy and time than heat-curing adhesives and offering advantages in large-scale manufacturing.

## Applications

- › Bipolar plate bonding
- › Gas diffusion layer fixation
- › Stack sealing

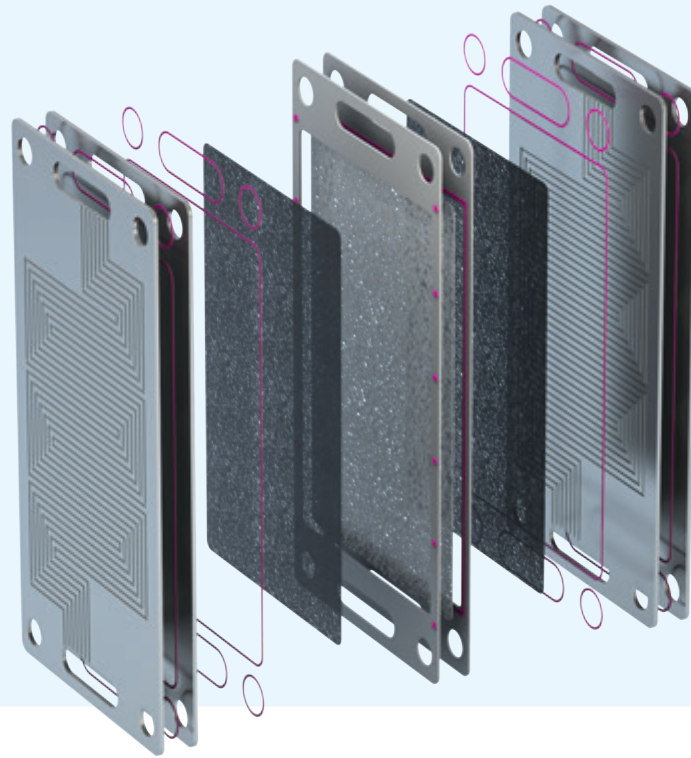
## Your benefits

- › Fast dispensing and curing in just a few seconds
- › Energy- and resource-saving process
- › High process reliability within assembly and operation

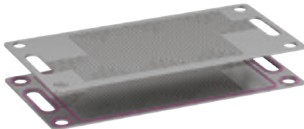
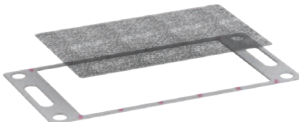



## Customizing

DELO offers modified adhesives tailored to customers' processing needs. This enables fast cycle times, high energy efficiency, and outstanding process reliability. As a premium partner, we provide our expertise to meet the demands of fuel cell applications.



## Requirements and solutions

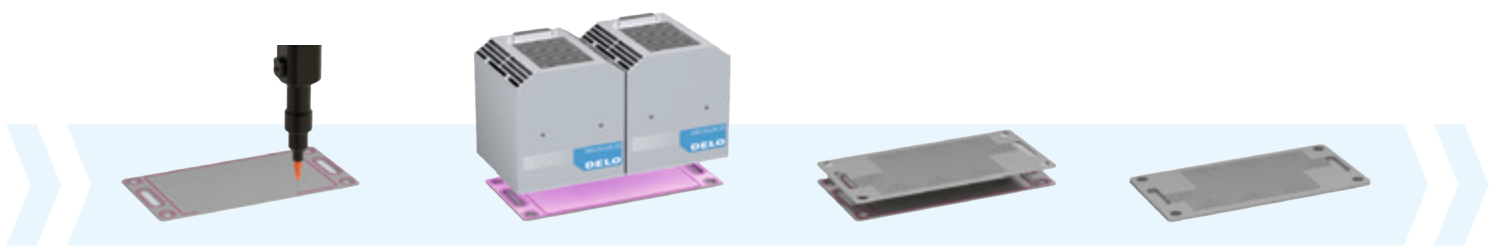
	Bipolar plate bonding	Gas diffusion layer fixation	Stack sealing
			
<b>General adhesive requirements</b>		<ul style="list-style-type: none"> <li>› Operation temperature +85°C</li> <li>› Resistance to cooling fluid, sulfuric acid, deionized water</li> <li>› Low leaching</li> <li>› Fast application and curing</li> </ul>	
<b>Special adhesive requirements</b>	<ul style="list-style-type: none"> <li>› Bonding of opaque substrates</li> <li>› Tightness</li> </ul>	<ul style="list-style-type: none"> <li>› High precision</li> <li>› Fast handling strength</li> <li>› Flexible adhesive for handling</li> </ul>	<ul style="list-style-type: none"> <li>› FIPG / CIPG</li> <li>› Layer thicknesses &lt; 100 µm or &gt; 500 µm</li> <li>› Tightness</li> </ul>
<b>Adhesive solutions</b>		<ul style="list-style-type: none"> <li>› DELO KATIOBOND</li> <li>› DELO PHOTOBOND PSA</li> <li>› DELO PHOTOBOND CIPG</li> </ul>	
<b>Suitable assembly processes</b>	<ul style="list-style-type: none"> <li>› Screen / stencil printing</li> <li>› Inkjetting</li> <li>› Slot-die coating</li> <li>› Volumetric dispensing</li> </ul>	<ul style="list-style-type: none"> <li>› Jetting with DELO-DOT PN5</li> </ul>	<ul style="list-style-type: none"> <li>› Screen / stencil printing</li> <li>› Inkjetting</li> <li>› Slot-die coating</li> <li>› Volumetric dispensing</li> </ul>

# Assembly process

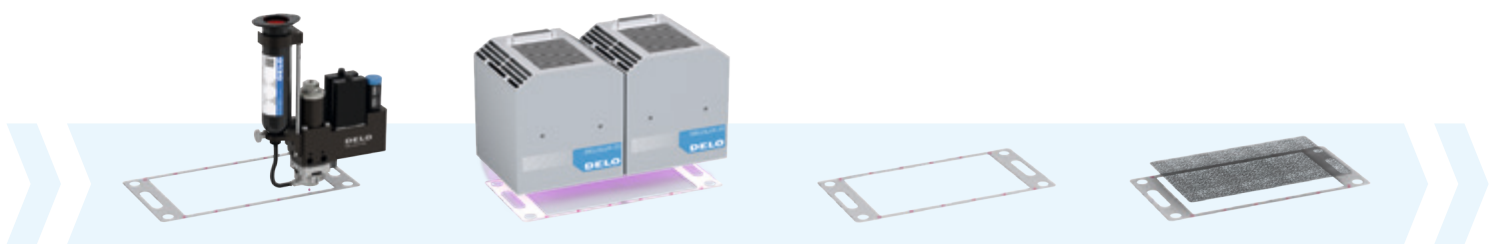
DELO adhesives ensure efficient, fast, and precise fuel cell stack assembly using tailored dispensing and curing techniques.

After determining process and operational requirements, we develop customized formulations, prioritizing high output, energy efficiency, process reliability, and design flexibility. Initial testing is performed in our lab using client components to verify effectiveness.

## Process examples



**Bipolar plate bonding:** Dispensing with DELO-DIV VD volume dispenser – Preactivation with DELOLUX 20 LED curing lamps – Joining within open time – Final curing at room temperature or accelerated by heat

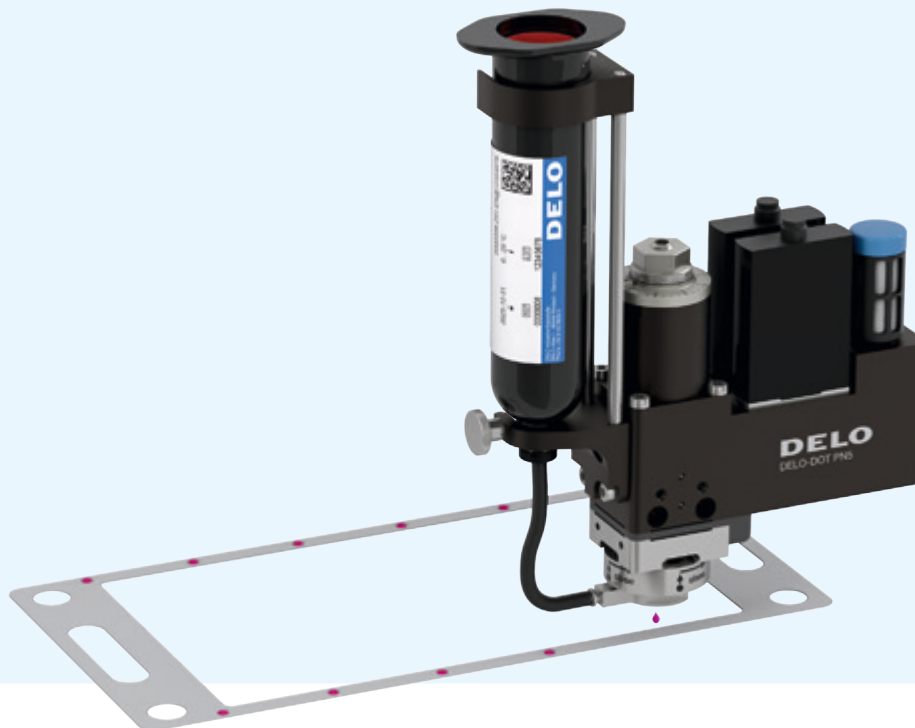


**Gas diffusion layer fixation:** Jetting with DELO-DOT PN5 microdispensing valve – Curing with DELOLUX 20 LED curing lamps – Tape phase – Joining with pressure









**Stack sealing:** Dispensing with DELO-DIV VD volume dispenser – Curing with DELOLUX 20 LED curing lamps – Positioning of membrane electrode assembly (MEA) – Compression





## Application technologies

DELO adhesives enable all the processing methods listed below for use in fuel cells.

		Dispensing speed	Accuracy	Achievable layer thickness
Slot-die coating		● ○ ○	● ● ○	> 50 $\mu\text{m}$ – 4,000 $\mu\text{m}$ > Stacking of layers possible
Screen printing		● ● ●	● ● ●	> 10 $\mu\text{m}$ – 100 $\mu\text{m}$ (to 400 $\mu\text{m}$ )
Stencil printing		● ● ●	● ● ●	> 20 $\mu\text{m}$ – 2,000 $\mu\text{m}$
Inkjetting		● ● ●	● ● ●	> Up to 50 $\mu\text{m}$ > Stacking of layers possible
Spraying		● ● ●	● ○ ○	> 10 $\mu\text{m}$ – 500 $\mu\text{m}$
Volumetric needle dispensing		● ○ ○	● ● ●	> 20 $\mu\text{m}$ – 4,000 $\mu\text{m}$ > Stacking of layers possible

# DELO

## DELO Industrial Adhesives

China | Czechia | France | Germany HQ | Italy | Japan  
Korea | Malaysia | Singapore | Thailand | USA

The data and information provided are based on tests performed under laboratory conditions. Reliable information about the behavior of the product under practical conditions and its suitability for a specific purpose cannot be concluded from this. It is the customer's responsibility to test the suitability of a product for the intended purpose by considering all specific requirements and by applying standards the customer deems suitable (e.g. DIN 2304-1). Type, physical and chemical properties of the materials to be processed with the product, as well as all actual influences occurring during transport, storage, processing and use, may cause deviations in the behavior of the product compared to its behavior under laboratory conditions. All data provided are typical average values or uniquely determined parameters measured under laboratory conditions. The data and information provided are therefore no guarantee for specific product properties or the suitability of the product for a specific purpose. Nothing contained herein shall be construed to indicate the non-existence of any relevant patents or to constitute a permission, encouragement or recommendation to practice any development covered by any patents, without permission of the owner of this patent. All products provided by DELO are subject to DELO's General Terms of Business. Verbal ancillary agreements are deemed not to exist.

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