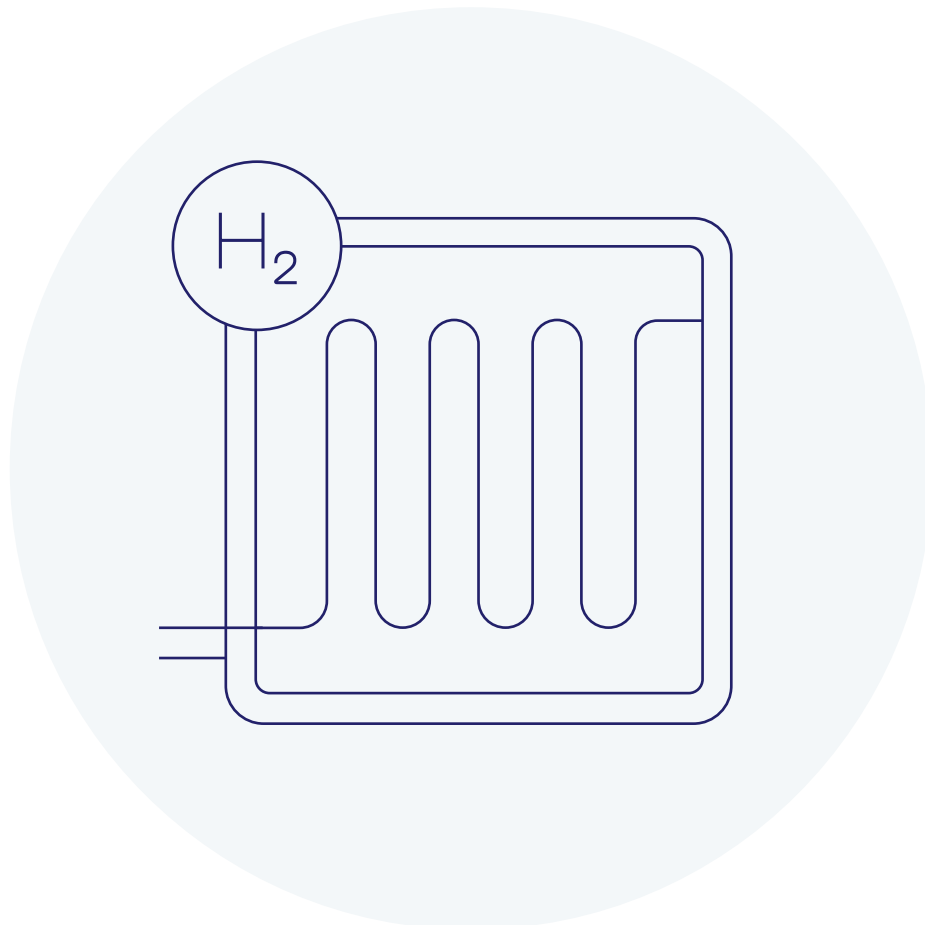


HYDROGEN TECHNOLOGY

CUSTOMISED SOLUTIONS BASED ON
POLYURETHANE, EPOXY AND SILICONE



WEVO – YOUR PARTNER FOR HYDROGEN TECHNOLOGY

Hydrogen is a key technology for the shift to sustainable transport systems and the energy transition – and a realistic alternative to battery-electric drives, especially in commercial vehicles and ships, and increasingly also in the rail and aviation sectors.

Fuel cell systems are technically very complex and place high demands on the materials used.

Customised potting compounds, adhesives and sealants from Wevo enable trouble-free production of components and ensure safe and reliable operation throughout the fuel cell or electrolysis system.

WEVO PROTECTS AND INSULATES YOUR TECHNOLOGY

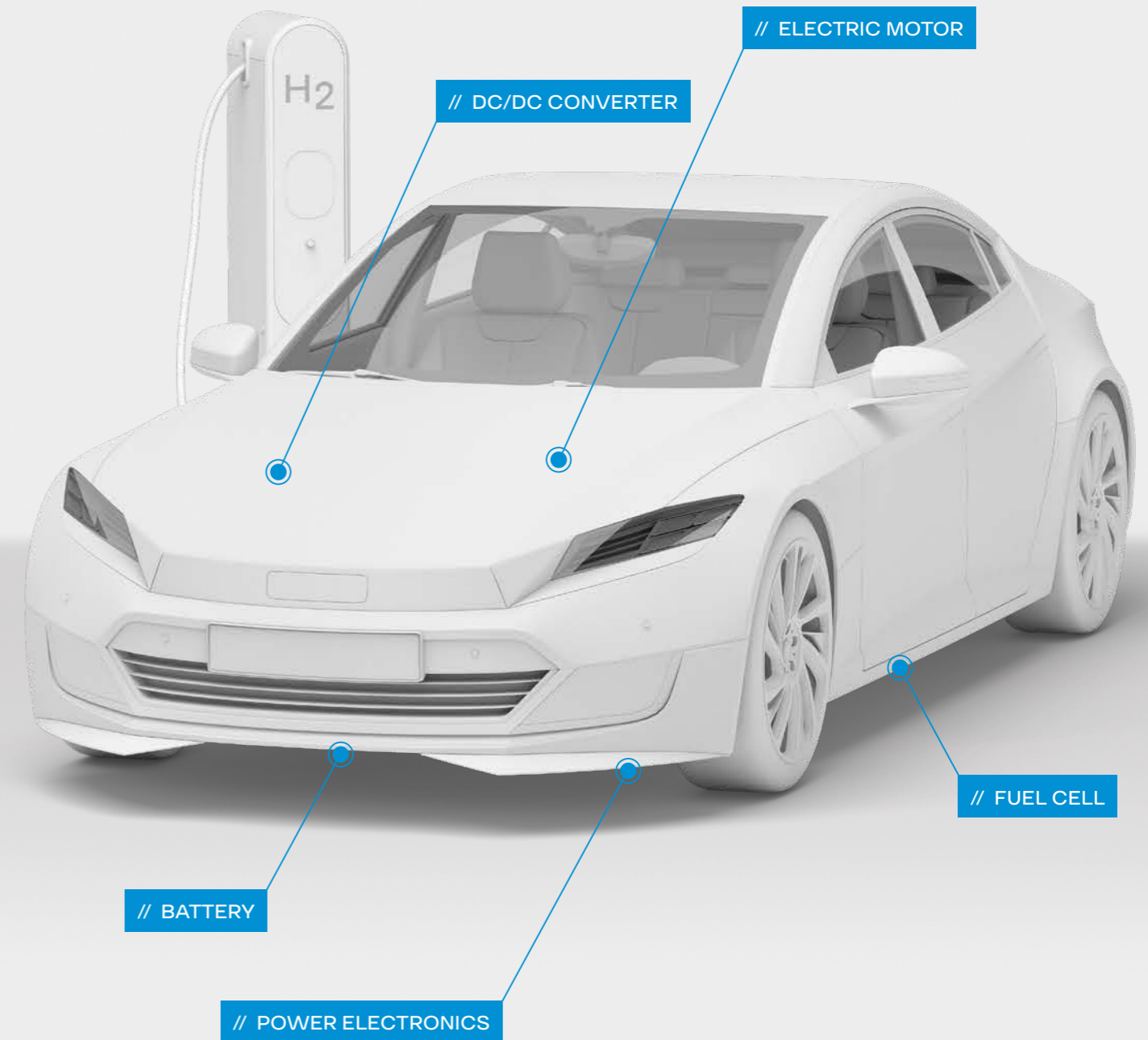
Customised potting compounds, adhesives and sealants from Wevo based on polyurethane, epoxy resin and silicone are used throughout the fuel cell system as well as in electrolysis systems for the production of green hydrogen from renewable energy sources.

Exceptionally gas-tight adhesives and sealants for manufacturing bipolar plates and assembling stacks enable safe and reliable operation of the fuel cell and the electrolyser. They are applied using a dispensing or screen-printing process, which enables fast and automated production.

High-ionic-purity adhesives and potting compounds are used in the cathode circulation system to seal and encapsulate air filters and humidifier modules.

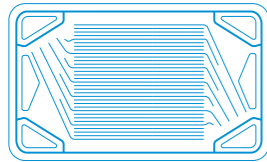
Wevo's thermally conductive potting compounds ensure the necessary heat dissipation and mechanical strength when it comes to motors for the air compressor and the anode recirculation blower or to power electronic components such as the DC/DC converter or the control units.

In short, our electrical insulating materials protect the complex system and withstand the challenging conditions of the different electrolytes.



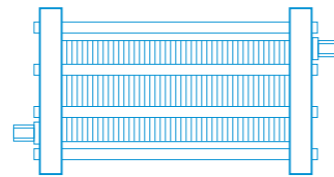
APPLICATIONS IN DETAIL

Regardless of their intended use, electronic components used in hydrogen technology applications require appropriate protection against environmental influences to ensure safe operation and a long service life.



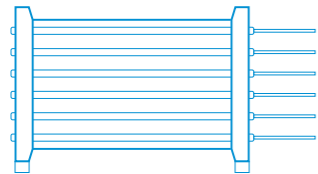
BIPOLAR PLATES

Bipolar plates based on metal or graphite compounds are reliably sealed using our addition-curing, silicone-based sealants as well as polybutadienes combining excellent impermeability to gas with very good adhesion.



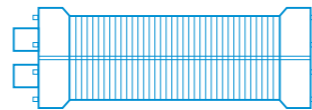
FUEL CELL STACKS

Bipolar plates manufactured from graphite compounds or metal are comprised of two half-shells, which are bonded to one another in a gas-tight manner using our polyurethane and silicone adhesives. The membrane electrode assembly can likewise be sealed and bonded to the other stack components.



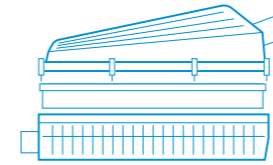
ELECTROLYSIS STACKS

Electrolysis stacks are sealed using our gas-tight silicones and polyurethanes. Our chemically inert and alkali-resistant epoxy adhesives ensure durable bonding of the stack components in alkaline electrolyzers.



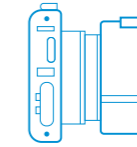
HUMIDIFIER MODULES

Our polyurethane adhesives have very high ionic purity and hydrolysis resistance, and are used in humidifier modules to simultaneously join and seal the polymer membranes and the spacer materials. Our potting compounds are first choice in hollow-fibre humidifiers.



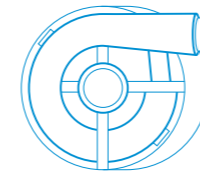
CATHODE FILTER (AIR FILTER)

The air filter protects the sensitive membrane and the catalyst layer of the fuel cell against pollutants and particles in the ambient air. Our adhesives and sealants bond the filter fleeces reliably and durably to the housing.



ANODE RECIRCULATION BLOWER

The anode recirculation blower conveys hydrogen that has not been consumed from the stack back to the hydrogen infeed with the aid of an electrically driven compressor wheel which runs at a very high rotational speed. The control unit and the electric motor are reliably protected and hermetically encapsulated by our potting compounds.



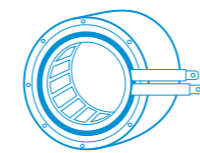
AIR COMPRESSOR MOTOR

The air compressor is an essential component in the fuel cell system's air circuit and runs at very high rotational speeds of up to 260,000 rpm. The heat generated and the high mechanical forces are reliably compensated by our epoxy-resin- and silicone-based potting compounds.



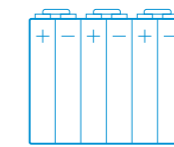
POWER ELECTRONICS
AND SENSORS

Our potting compounds reliably protect the power electronic components of the fuel cell system such as the DC/DC converter, the control unit, various sensors or the on-board charger against vibration, moisture, dust and thermal shocks.



ELECTRIC MOTOR

State-of-the-art electric motors achieve enormous power density. The heat generated needs to be dissipated. Our high-performance, low-viscosity potting systems were developed based on polyurethane and epoxy resin to enable the rotor and stator to be encapsulated without voids.



BATTERY MODULE

Our optimised adhesives and potting compounds help battery manufacturers solve design challenges and increase safety and reliability. Our customised, thermally conductive potting compounds and gap fillers can act as both a heat-conductive medium and a structural bonding material.

WEVO SOLUTIONS IN DETAIL

Fuel cell and electrolysis systems are technically very complex and place high demands on the materials used.

Applications	BIPOLAR PLATES	FUEL CELL STACKS	ELECTROLYSIS STACKS	HUMIDIFIER MODULES	CATHODE FILTER (AIR FILTER)
Requirements	<ul style="list-style-type: none"> Low hydrogen permeation/high gas impermeability High hydrolysis and chemical resistance Low compression set 	<ul style="list-style-type: none"> Low hydrogen permeation/high gas impermeability High hydrolysis and chemical resistance Good water/glycol resistance Low compression set 	<ul style="list-style-type: none"> Low hydrogen permeation/high gas impermeability High hydrolysis and chemical resistance High pressure resistance Low compression set 	<ul style="list-style-type: none"> High ionic purity/low VOC level High hydrolysis and chemical resistance Good adhesion 	<ul style="list-style-type: none"> High ionic purity/low VOC level High hydrolysis and chemical resistance Good adhesion

Applications	ANODE RECIRCULATION BLOWER	AIR COMPRESSOR MOTOR	POWER ELECTRONICS AND SENSORS	ELECTRIC MOTOR	BATTERY MODULE
Requirements	<ul style="list-style-type: none"> Good flow properties, low mixed viscosity Low hydrogen permeation/high gas impermeability High temperature resistance 	<ul style="list-style-type: none"> High temperature resistance Low hydrogen permeation/high gas impermeability Low susceptibility to cracking 	<ul style="list-style-type: none"> Good heat dissipation/high thermal conductivity High dielectric strength Good adhesion 	<ul style="list-style-type: none"> High temperature resistance, insulation class F or higher Low susceptibility to cracking High thermal conductivity 	<ul style="list-style-type: none"> Good adhesion to metals and plastics High thermal conductivity Flame-retardant or self-extinguishing

The table on the following pages contains a selection of representative products that largely meet these requirements. It serves as a guide to help you select the right product for your application. Other variants with modified flow behaviour or modified viscosity are available on request. Our adhesives and sealants are applied by means of either a dispensing or a screen-printing process. Depending on the application method and the geometry of the seal or adhesive bead required, you should choose either self-levelling or stable (thixotropic) variants. Particularly in the case of silicones, variants with a long pot life are available for application by screen printing. Thermal curing of the polyurethanes is carried out at temperatures up to 80°C and between 100 and 140°C for the silicones, either in a convection oven alone or combined with near-infrared radiators. Customer-specific modifications and product developments are generally available on request.

Material		PUR					POX			SIL					
		POLYURETHANE					EPOXY			SILICONE					
Resin/ component A		WEVOPUR 78906 T	WEVOPUR 78901/40	WEVOPUR 79952	WEVOPUR 79086 T	WEVOPUR 56005 FL	WEVOPOX 30010	WEVOPOX 36001 FL	WEVOPOX 2513	WEVOPOX 32702	WEVOSIL 28001 A	WEVOSIL 28002 A	WEVOSIL 28003 A	WEVOSIL 18001 T	WEVOSIL 22105 FL A
Resin/ component B		WEVONAT 385	WEVONAT 385	WEVONAT 385	WEVONAT 600	WEVONAT 900	WEVODUR 5007	WEVODUR 5001	WEVODUR 1003/07	WEVODUR 5008	WEVOSIL 28001 B	WEVOSIL 28002 B	WEVOSIL 28003 B	WEVOSIL 18001 T B	WEVOSIL 22105 FL B
Mixing ratio (parts by weight)		100:22	100:18	100:26	100:25	100:09	100:33	100:10	100:13	100:10	1:1	1:1	1:1	1:1	1:1
Mixed viscosity at 22°C [mPa·s]	Rotational viscometer / rheometer	10,000–25,000	5,000–10,000	1,000–2,500	28,000–38,000	6,000–10,000	1,000–2,000 (thixotropic variant available)	3,500–6,500	3,000–6,000	2,000–3,500 (thixotropic variant available)	30,000–60,000	100,000–150,000	12,500–22,500	thixotrop	3,000–5,000
Reactivity at 22°C [min.] ^a	Rotational viscometer / rheometer	30–50	30–40	30–50	25–45	45–65	40–50	180–240	30 at 120°C	60–80	60–90, accelerated at 100–140°C	60–90, accelerated at 100–140°C	> 180 accelerated at 100–140°C	> 24 h accelerated at 100–140°C	50–70
Shore hardness 00/A/D	DIN ISO 7619-1:2012-02	-- / 78–88 / --	-- / 65–75 / --	-- / 70–80 / --	-- / -- / 45–50	-- / -- / 45–55	-- / -- / 80–90	-- / -- / 85–90	-- / -- / 90–95	-- / -- / 80–90	-- / 60–70 / --	-- / 30–40 / --	-- / 50–60 / --	-- / 60–70 / --	50–70 / 10–20 / --
Operating temperature [°C]	DIN 53505	-60 up to +125	-60 up to +110	-60 up to +125	-30 up to +130	-40 up to +130	-30 up to +140	-40 up to +180	-40 up to +180	-40 up to +130	-60 up to +200	-60 up to +200	-60 up to +200	-60 up to +200	-60 up to +200
E modulus [N/mm ²]	DIN EN ISO 527-2:2012-06	50	11	15	70	50	2,600	6,000	11,000	6,200	4.5	3	3.5	4.0	0.4
Elongation at break [%]	DIN EN ISO 527-2:2012-06	85	96	280	84	34	9	1	0.9	1.4	100	300	65	70	150
Thermal conductivity [W/m·K]	DIN EN ISO 22007-2:2015-12	0.32	0.31	0.36	0.52	1.55	0.20	1.00	1.40	0.33	0.35	0.30	0.20	0.35	1.5
Glass transition temperature [°C]	TMA ISO 11359-2:1999-10	-60	-56	-63	25	-3	98	51	52	76	-55	< -45	< -45	< -55	-45
Water absorption [%]	30 days, 22°C	–	–	0.5	0.6	0.4	0.6	–	< 0.2	0.3	< 0.2	–	< 0.3	< 0.2	< 1.5
Flammability	UL 94	HB	HB	HB	HB	V-0 1.5 mm ^{**}	HB	V-0 2 mm ^{**}	HB	HB	V-1	V-1	HB	V-1	V-0 6 mm
Dielectric strength [kV/mm]	DIN EN 60243-1:2014-01	> 20	–	27	> 25	28	> 18	25	20	–	> 30	> 25	> 27	> 25	> 20
Strengths		Thixotropic, high ionic purity, low hydrogen permeability	Low hydrogen permeability	High resistance in alkaline electrolytes, hydrogen permeability	Very low hydrogen permeability	High thermal conductivity	Very good chemical resistance in alkaline electrolytes	High thermal conductivity, low CTE	High thermal conductivity, low CTE	Very good chemical resistance in alk. and acidic electrolytes	Very good chemical resistance, good adhesion	Low hydrogen permeability	Thixotropic, good chemical resistance	High thermal conductivity, low susceptibility to cracking	High thermal conductivity, low susceptibility to cracking
Applications		Sealing and bonding of bipolar plates for fuel cells, electrolyzers and humidifier modules	Sealing and bonding of bipolar plates and humidifier modules	Sealing and bonding of bipolar plates for alkaline electrolyzers, air filters and humidifier modules	Gas-tight bonding of bipolar plates, air filters and humidifier modules, thixotropic	Thermally conductive adhesive for batteries and power electronic components	Bonding of electrolysis stacks	Air compressor, anode recirculation blower, power electronics, DC/DC converter, OBC	Air compressor, anode recirculation blower, power electronics, DC/DC converter, OBC	Bonding of electrolysis stacks and batteries	Sealing and bonding of bipolar plates and humidifier modules	Sealing and bonding of bipolar plates and humidifier modules	Sealing and bonding of bipolar plates for alkaline electrolyzers	Sealing and bonding of bipolar plates and humidifier modules	Air compressors, anode recirculation blowers, power electronics, DC/DC converters, OBCs

All processing parameters relate to room temperature. All mechanical, thermal and electrical data refer to fully cured products.
^a The interval of the specified processing times relates to the standard variations currently offered. Customised versions can be modified to match the respective application.
^{**} Approved under UL file No. E108835.
 For further information, see the detailed technical data sheets for each of our products.

ADDED BENEFITS BY WEVO PRODUCTS

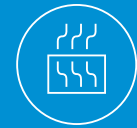
Our wide range of products offers a variety of benefits in addition to solving classic problems such as providing insulation and moisture protection for electrical installations.



Our 2-component reactive resins cure at room temperature, even in the absence of air. No volatile and corrosive decomposition products (fumes) are released. Curing can be carried out at room temperature or be accelerated by increasing the temperature.



Our products offer optimised resistance in acidic or alkaline environments, are resistant to damp heat and are often characterised by very high ionic purity.



Some of our materials have increased thermal conductivities of up to 4 W/m·K and can be used as thermally conductive potting compounds or gap filler materials.



Wevo materials are temperature-resistant up to +180 °C. Our portfolio includes polyurethane resins of insulating classes B and F as well as epoxy and silicone resins of insulating classes F and H.



Wevo solutions exhibit outstanding electrical properties with CTI 600, high dielectric strength greater than 20 KV/mm as well as other outstanding dielectric properties.



Wevo materials can be adjusted in terms of their reaction times, flow behaviour and to the individual needs of the production process. Thixotropic versions are available on request.



WE ARE MUCH MORE THAN A SUPPLIER

From development to volume production – we support our customers every step along the way.



WE PIONEER PROGRESS

We are a proven partner in project-driven innovation with a decades-long track record.



WE INITIATE INNOVATION

We develop new ideas for every area of electrical component potting, casting, bonding and sealing.

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.

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