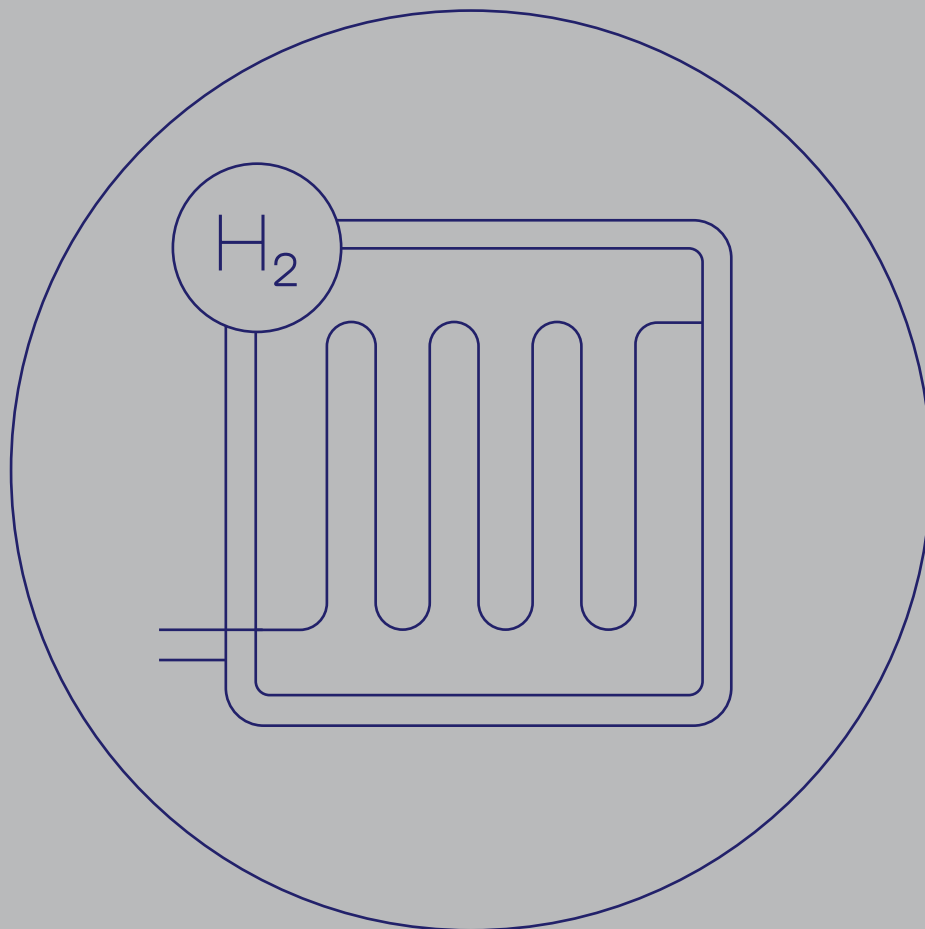




**wevo**

# HYDROGEN TECHNOLOGY



# 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

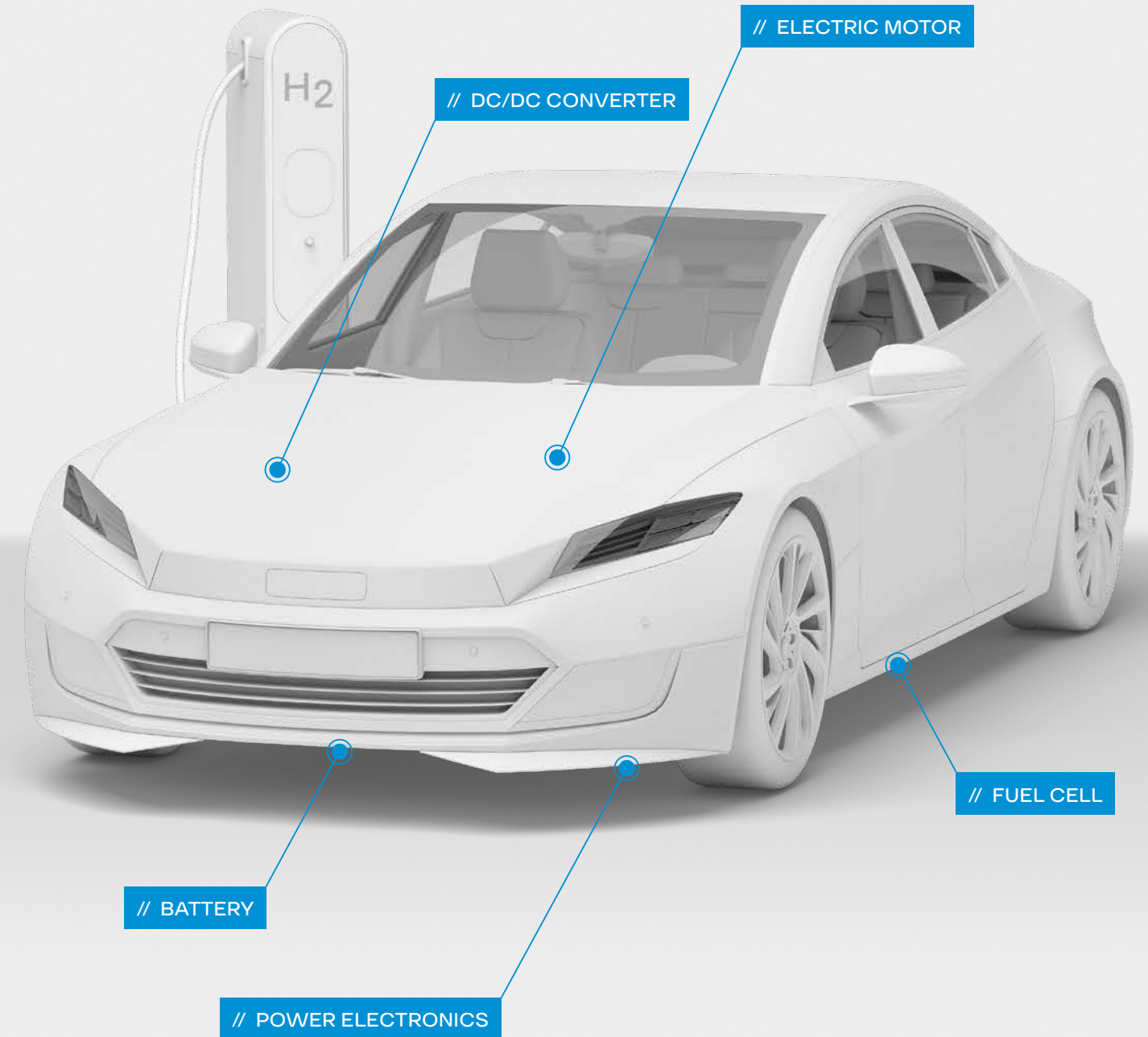
Customised potting compounds, adhesives and sealants from Wevo based on polyurethane, epoxy resin and silicone are used throughout the fuel cell system as well as in electrolysis systems for the production of green hydrogen from renewable energy sources.

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.

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

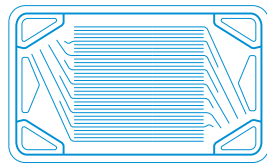
Wevo's thermally conductive potting compounds ensure the necessary heat dissipation and mechanical strength when it comes to motors for the air compressor and the anode recirculation blower or to power electronic components such as the DC/DC converter or the control units.

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



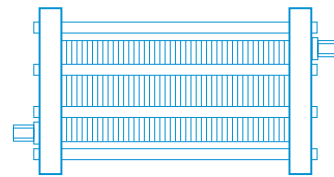
# APPLICATIONS IN DETAIL

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.



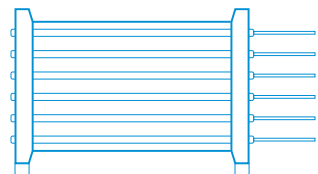
**BIPOLAR PLATES**

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.



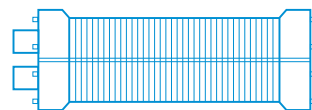
**FUEL CELL STACKS**

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.



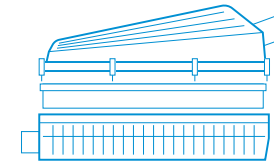
**ELECTROLYSIS STACKS**

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.



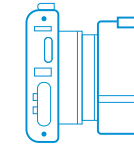
**HUMIDIFIER MODULES**

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.



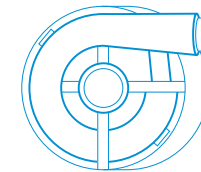
**CATHODE FILTER (AIR FILTER)**

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.



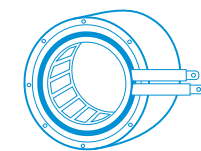
**AIR COMPRESSOR MOTOR**

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.



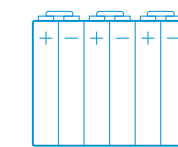
**POWER ELECTRONICS AND SENSORS**

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)
<b>Requirements</b>	<ul style="list-style-type: none"> <li>Low hydrogen permeation/high gas impermeability</li> <li>High hydrolysis and chemical resistance</li> </ul>	<ul style="list-style-type: none"> <li>Low hydrogen permeation/high gas impermeability</li> <li>High hydrolysis and chemical resistance</li> </ul>	<ul style="list-style-type: none"> <li>Low hydrogen permeation/high gas impermeability</li> <li>High hydrolysis and chemical resistance</li> </ul>	<ul style="list-style-type: none"> <li>High ionic purity/low VOC level</li> <li>High hydrolysis and chemical resistance</li> </ul>	<ul style="list-style-type: none"> <li>High ionic purity/low VOC level</li> <li>High hydrolysis and chemical resistance</li> </ul>
<b>Possible solutions</b>	<b>WEVOPUR/WEVONAT</b> <ul style="list-style-type: none"> <li>79954/15 with 385</li> <li>78901/40 with 385</li> <li>VP 408 and thixotropic variants with 385</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>28001 (A/B)</li> <li>28002 (A/B)</li> </ul>	<b>WEVOPUR/WEVONAT</b> <ul style="list-style-type: none"> <li>79086 T with 385</li> <li>78901/40 with 385</li> <li>895 and thixotropic variants with 600</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>28001 (A/B)</li> <li>28002 (A/B)</li> </ul>	<b>WEVOPOX/WEVODUR</b> <ul style="list-style-type: none"> <li>30010 with 5007</li> <li>32702 with 5008</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>28001 (A/B)</li> <li>28002 (A/B)</li> </ul>	<b>WEVOPUR/WEVONAT</b> <ul style="list-style-type: none"> <li>79954/15 with 385</li> <li>79086 T with 385</li> <li>78901/40 with 385</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>28001 (A/B)</li> <li>28002 (A/B)</li> </ul>	<b>WEVOPUR/WEVONAT</b> <ul style="list-style-type: none"> <li>78901/40 with 385</li> <li>79086 and thixotropic variants with 600</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>28001 (A/B)</li> <li>28002 (A/B)</li> </ul>

Applications	ANODE RECIRCULATION BLOWER	AIR COMPRESSOR MOTOR	POWER ELECTRONICS AND SENSORS	ELECTRIC MOTOR	BATTERY MODULE
<b>Requirements</b>	<ul style="list-style-type: none"> <li>Good flow properties, low mixed viscosity</li> <li>Low hydrogen permeation/high gas impermeability</li> <li>High temperature resistance</li> </ul>	<ul style="list-style-type: none"> <li>High temperature resistance</li> <li>Low hydrogen permeation/high gas impermeability</li> <li>Low susceptibility to cracking</li> </ul>	<ul style="list-style-type: none"> <li>Good heat dissipation/high thermal conductivity</li> <li>High dielectric strength</li> <li>Good adhesion</li> </ul>	<ul style="list-style-type: none"> <li>High temperature resistance, insulation class F or higher</li> <li>Low susceptibility to cracking</li> <li>High thermal conductivity</li> </ul>	<ul style="list-style-type: none"> <li>Good adhesion to metals and plastics</li> <li>High thermal conductivity</li> <li>Flame-retardant or self-extinguishing</li> </ul>
<b>Possible solutions</b>	<b>WEVOPOX/WEVODUR</b> <ul style="list-style-type: none"> <li>2513 with 1003/07</li> <li>36001 FL with 5001</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>27015 FL (A/B)</li> <li>22002 FL (A/B)</li> <li>22005 FL (A/B)</li> </ul>	<b>WEVOPOX/WEVODUR</b> <ul style="list-style-type: none"> <li>2513 with 1003/07</li> <li>36001 FL with 5001</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>27015 FL (A/B)</li> <li>22002 FL (A/B)</li> <li>22005 FL (A/B)</li> </ul>	<b>WEVOPUR/WEVONAT</b> <ul style="list-style-type: none"> <li>512 FL with 900</li> <li>60416 FL with 300 RE</li> <li>67210 FL with 507</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>22006 FL (A/B)</li> <li>22002 FL (A/B)</li> <li>26010 FL (A/B)</li> </ul>	<b>WEVOPOX/WEVODUR</b> <ul style="list-style-type: none"> <li>2513 with 1003/07</li> <li>36001 FL with 5001</li> <li>34020 with 5001</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>27015 FL (A/B)</li> <li>22005 FL (A/B)</li> </ul>	<b>WEVOPUR/WEVONAT</b> <ul style="list-style-type: none"> <li>68389 FL with 600</li> <li>56005 FL with 900</li> <li>512 FL with 900</li> </ul> <b>WEVOSIL</b> <ul style="list-style-type: none"> <li>22006 FL (A/B)</li> <li>26009 FL (A/B)</li> </ul>



Material	POLYURETHANE						EPOXY				SILICONE				
Resin / component A	WEVOPUR 79954/15	WEVOPUR 78901/40	WEVOPUR VP 408	WEVOPUR 79086 T	WEVOPUR 68389 FL	WEVOPUR 60416 FL	WEVOPOX 30010	WEVOPOX 36001 FL	WEVOPOX 2513	WEVOPOX 32702	WEVOSIL 28001	WEVOSIL 28002	WEVOSIL 27015 FL	WEVOSIL 22005 FL	
Resin / component B	WEVONAT 385	WEVONAT 385	WEVONAT 9015	WEVONAT 600	WEVONAT 600	WEVONAT 300 RE	WEVODUR 5007	WEVODUR 5001	WEVODUR 1003/07	WEVODUR 5008	WEVOSIL 28001	WEVOSIL 28002	WEVOSIL 27015 FL	WEVOSIL 22005 FL	
<b>Mixing ratio (parts by weight)</b>	100:22	100:18	100:20	100:25	100:10	100:07	100:33	100:10	100:13	100:10	1:1	1:1	1:1	1:1	
<b>Mixed viscosity at 22°C [mPa·s]</b>	Rotational viscometer / rheometer	15,000–30,000	5,000–10,000	2,000–3,500	28,000–38,000	30,000–60,000	5,000–12,000	1,000–2,000	3,500–6,500	3,000–6,000	2,000–3,500	30,000–60,000	100,000–150,000	2,500–5,000	4,000–8,000
<b>Reactivity at 22°C [min.]°</b>	Rotational viscometer / rheometer	15–20	30–40	20–30	25–45	20–30	40–60	40–50	180–240	30 at 120°C	60–80	60–90, accelerated at 140°C	60–90, accelerated at 140°C	> 180	50–70
<b>Shore hardness 00/A/D</b>	DIN ISO 7619-1:2012-02	-- / 80–90 / --	-- / 65–75 / --	70–90 / -- / --	-- / -- / 45–50	-- / -- / 70–80	-- / -- / 65–70	-- / -- / 80–90	-- / -- / 85–90	-- / -- / 90–95	-- / -- / 80–90	-- / 60–70 / --	-- / 30–40 / --	-- / 60–70 / --	-- / 55–65 / --
<b>Operating temperature [°C]</b>	DIN 53505	-60 up to +125	-60 up to +110	-60 up to +120	-30 up to +130	-40 up to +135	-50 up to +165	-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 +180
<b>E modulus [N/mm²]</b>	DIN EN ISO 527-2:2012-06	48	11	2	70	480	320	2,600	6,000	11,000	6,200	4.5	3	2.8	15
<b>Elongation at break [%]</b>	DIN EN ISO 527-2:2012-06	120	96	280	84	13	10	9	1	0.9	1.4	100	300	55	20
<b>Thermal conductivity [W/m·K]</b>	DIN EN ISO 22007-2:2015-12	0.32	0.31	0.20	0.52	1.40	1.70	0.20	1.00	1.40	0.33	0.35	0.30	2.10	1.50
<b>Glass transition temperature [°C]</b>	TMA ISO 11359-2:1999-10	-56	-56	-64	25	17	-12	98	51	52	76	-55	< -45	< -60	-50
<b>Water absorption [%]</b>	30 days, 22°C	0.8	–	–	0.6	–	0.7	0.6	–	0.16	0.3	< 0.2	–	–	< 0.2
<b>Flammability</b>	UL 94	HB	HB	HB	HB	V-0 4 mm	V-0 1.5 mm**	HB	V-0 2 mm**	V-0 2 mm**	HB	V-1	V-1	V-0	V-0 4 mm
<b>Dielectric strength [kV/mm]</b>	DIN EN 60243-1:2014-01	> 18	–	> 15	> 25	> 20	> 20	> 18	25	20	–	> 30	> 25	> 20	30
<b>Strengths</b>		Thixotropic, high ionic purity, low hydrogen permeability	Low hydrogen permeability	Low hydrogen permeability	Very low hydrogen permeability	High thermal conductivity	High thermal conductivity	Very good chemical resistance	High thermal conductivity, low CTE	High thermal conductivity, low CTE	Very good chemical resistance	Very good chemical resistance	Low hydrogen permeability	High thermal conductivity, low susceptibility to cracking	High thermal conductivity, low susceptibility to cracking
<b>Applications</b>		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, air filters and humidifier modules	Gas-tight bonding of bipolar plates, air filters and humidifier modules, thixotropic	Thermally conductive adhesive for batteries	Air compressor, anode recirculation blower, power electronics, DC/DC converter, OBC	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	Air compressor, anode recirculation blower, power electronics, DC/DC converter, OBC	Air compressor, anode recirculation blower, power electronics, DC/DC converter, OBC

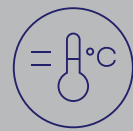
All processing parameters relate to room temperature. All mechanical, thermal and electrical data refer to fully cured products.  
 ° The interval of the specified processing times relates to the standard variations currently offered. Customised versions can be modified to match the respective application.  
 \*\* 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

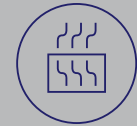
Our wide range of products offers a variety of benefits in addition to solving classic problems such as providing insulation and moisture protection for electrical installations.



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



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.



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 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.



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



In addition to standard materials produced to withstand temperatures of up to +180°C, we offer materials suitable for even higher temperatures. Several resins have undergone accelerated aging tests and have been certified to UL 746 B, with listed RTI values up to 160 and CTI values of 600 (UL file No. E108835).



## WE ARE MUCH MORE THAN A SUPPLIER

From development to volume production – we offer customer support 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 bonding, casting 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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