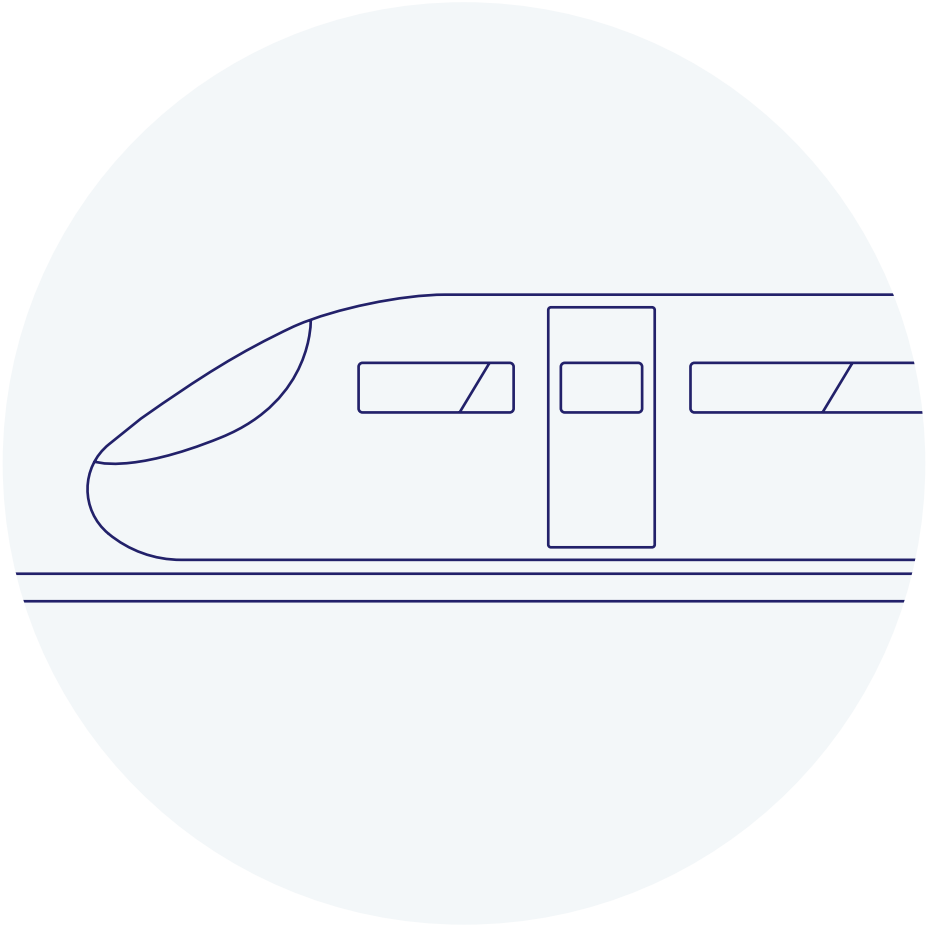
wevo

RAILWAY

CUSTOMISED SOLUTIONS BASED ON
POLYURETHANE, EPOXY AND SILICONE



WEVO MOVES – IN ROLLING STOCK AND TRACK APPLICATIONS

The insulation and heat management of electronic and electrical parts in railway applications, including rolling stock and track systems, are becoming increasingly stringent and important.

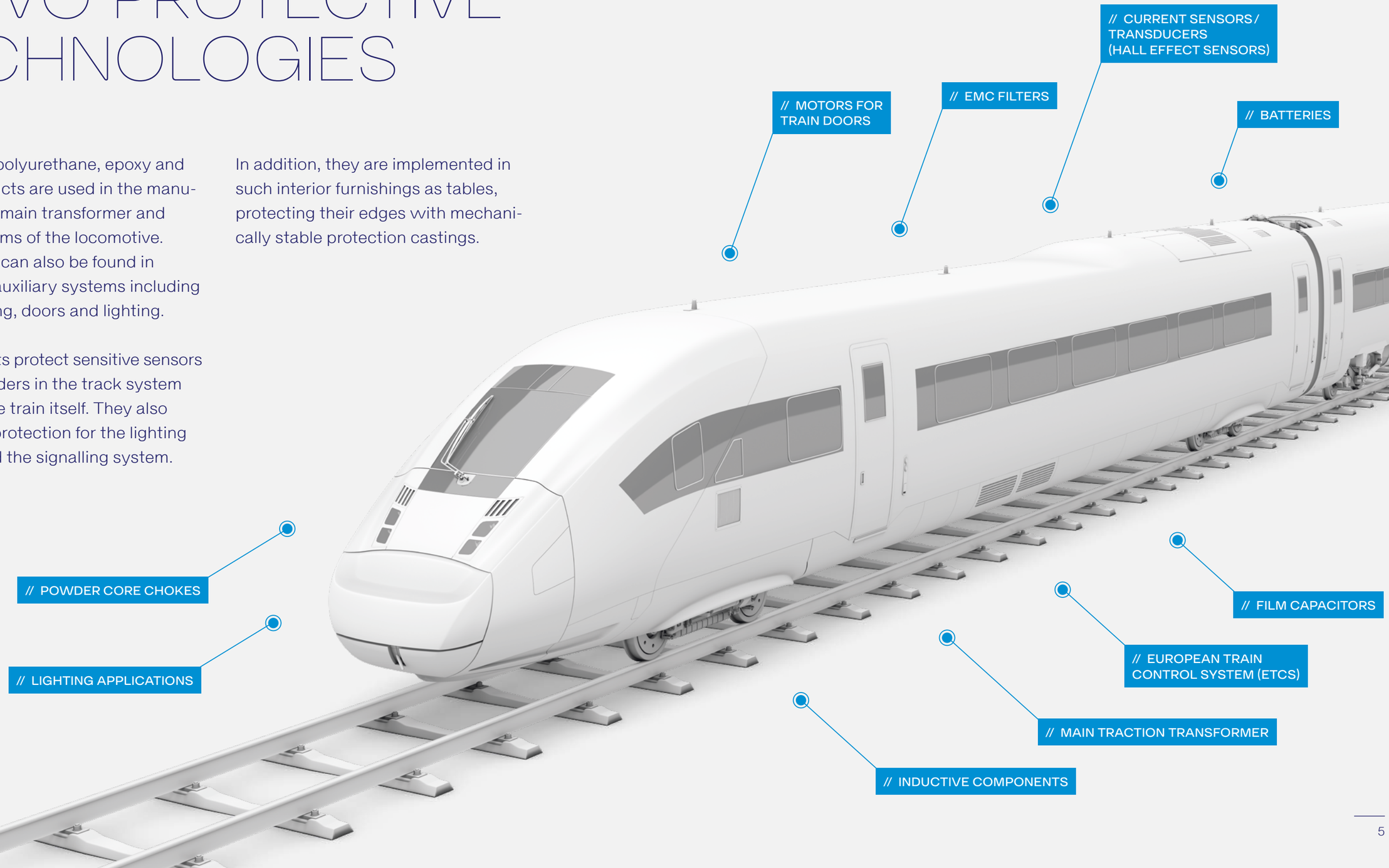
Wevo provides tailor-made potting compounds, adhesives, sealants, thermal interface materials (TIM) and foams to protect sensitive electronics (e.g. sensors and electrical components such as chokes and transformers). Our solutions protect against environmental influences and help to dissipate heat, contributing to higher efficiency and a longer component life.

WEVO PROTECTIVE TECHNOLOGIES

Our range of polyurethane, epoxy and silicone products are used in the manufacture of the main transformer and traction systems of the locomotive. Our products can also be found in various train auxiliary systems including air conditioning, doors and lighting.

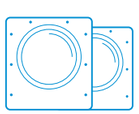
Wevo products protect sensitive sensors and transponders in the track system and within the train itself. They also provide vital protection for the lighting of tunnels and the signalling system.

In addition, they are implemented in such interior furnishings as tables, protecting their edges with mechanically stable protection castings.



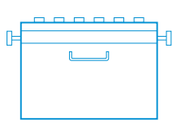
APPLICATIONS IN DETAIL

The protection of electronic and electrical components within the train and track systems require varying solutions. Wevo products range from classical potting applications in transformers, chokes and capacitors to high-performance materials used for various other applications.



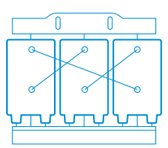
LIGHTING APPLICATIONS

Wevo transparent polyurethane, epoxy and silicone resins are used for protecting sensitive LEDs in signals, safety tunnel lighting and wagon interiors.



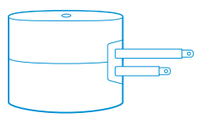
BATTERIES

Wevo thermal conductive potting compounds, adhesives and gap filler materials are used in the assembly of battery and ultra-capacitor packs and modules and play an important role in the thermal management of the system.



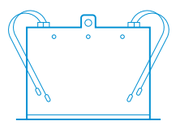
MAIN TRACTION TRANSFORMER

Wevo high-performance hot-curing epoxy resins are used for potting of dry transformers and can withstand elevated temperatures up to insulation class H.



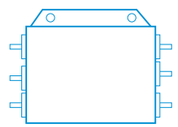
POWDER CORE CHOKES

Powder core chokes consist of 2 half shells made of iron powder with an inserted coil. They are assembled by potting with highly-filled polyurethane or epoxy resins with a low CTE and are commonly used in the traction inverter system of the train.



INDUCTIVE COMPONENTS

Power transformers, middle frequency transformers and chokes are used as part of the inverter system and also such auxiliaries as the air conditioning system of the train. Our high-performance polyurethane, epoxy and silicone materials protect them against environmental influences.

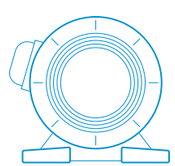


EMC FILTERS

The train electrical system is very complex with many high power electrical devices, which can generate severe electromagnetic interference. EMC filters, potted with our low viscosity polyurethane resins and foams, reduce undesired current peaks.

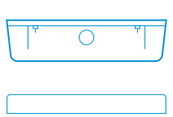
FILM CAPACITORS

Metallised polymer film capacitors are potted with polyurethane or epoxy resins and are used as power capacitors for resonant filtering or frequency conversion. DC link capacitors may be used in the air conditioning system of the train.



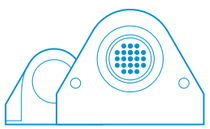
TRACTION MOTORS

Increased environmental impacts such as high temperatures or mechanical stress, due to snow, rocks or salt, require modern insulation materials for traction motors. Our epoxy and silicone solutions are used for stator potting and sealing of the windings heads.



EUROPEAN TRAIN CONTROL SYSTEM (ETCS)

Wevo flexible polybutadiene and silicone materials protect sensors, balises and transponders against cold temperatures and humidity for such applications as wheel detection, axle counter on tracks, speed-measurement, train identification or the track release.



CURRENT SENSORS / TRANSDUCERS (HALL EFFECT SENSORS)

Current transducers are used for measuring currents and signals in the traction system of the train and auxiliaries. For sensitive hall sensors, Wevo low T_g polyurethane and silicone resins provide soft encapsulation materials with minimal stress.

WEVO SOLUTIONS IN DETAIL

Different applications require different products with special properties.

Applications	LIGHTING APPLICATIONS / LED POTTING	BATTERIES	MAIN TRACTION TRANSFORMER	POWDER CORE CHOKES	INDUCTIVE COMPONENTS
Requirements	• High transparency • High UV stability	• Good adhesion on plastics and metals • Thermal conductivity • Good thermal shock resistance	• Low CTE, high E-modulus • Class F and higher • High T_g	• Low CTE, high E-modulus • Usually class F, preferably class H • UL 94 V-0	• Good impregnation • Usually class F, sometimes class H • UL 94 V-0, if possible EN 45545-2 approval
Possible solutions	WEVOPUR • 1211 • 1222 • 1240 (transluscent) WEVOSIL • 20001 (A/B)	WEVOPUR / WEVONAT • 60910 FL with 900 • PD 64510 FL with 900 • 68517 with 600 WEVOSIL • 26010 FL (A/B)	WEVOPOX / WEVODUR • 2315 with 42 M • 36001 FL with 5001	WEVOPUR / WEVONAT • 60416 FL with 300 RE WEVOPOX / WEVODUR • 8260 FL with 1018/25 • 36001 FL with 5001	WEVOPUR / WEVONAT • 403 FL/XX with 300 RE WEVOPOX / WEVODUR • 8260 FL with 1018/25 • 36001 FL with 5001

Applications	EMC FILTERS	FILM CAPACITORS	MOTORS FOR TRAIN DOORS	EUROPEAN TRAIN CONTROL SYSTEM (ETCS)	CURRENT SENSORS / TRANSDUCERS (HALL EFFECT SENSORS)
Requirements	• Good flowing behaviour, low mixed viscosity • UL 94 V-0	• Low water absorption • Good dielectric properties • UL 94 V-0 • EN 45545-2 (≥ HL2)	• Good heat dissipation • Usually class F resin required	• EMC compatibility • Good temperature shock resistance • Low water absorption	• Low T_g • Soft material, no impact on 0-Level at low temperatures • UL 94 V-0
Possible solutions	WEVOPUR / WEVONAT • 512 FL with 900 • 552 FL/70 with 300 L	WEVOPUR / WEVONAT • 512 FL/50 with 900 E • 512 FLE with 900 E • 67210 FL with 507 • 552 FL(S) with 300 WEVOPOX / WEVODUR • 8260 FL with 1018/25 • 36001 FL with 5001	WEVOPUR / WEVONAT • 403 FL/XX with 300 RE • 60416 FL with 300 RE • 67210 FL with 507 WEVOPOX / WEVODUR • 2513 with 1003/7 • 36001 FL with 5001	WEVOPUR / WEVONAT • PD 52 with 385 • PD 445 with 385 WEVOSIL • 22006 FL (A/B)	WEVOPUR / WEVONAT • 9251 FL with 300 RE • 3012 FL with 300 HL • 63512 FL with 500

		PUR							POX					SIL			
Material		POLYURETHANE							EPOXY					SILICONE			
Resin / component A		WEVOPUR PD 52	WEVOPUR 403 FL/33	WEVOPUR 512 FLE	WEVOPUR 552 FL	WEVOPUR 552 FLX	WEVOPUR 67210 FL	WEVOPUR 9251 FL	WEVOPOX 2003 FL	WEVOPOX 36001 FL	WEVOPOX 8260 FL/60	WEVOPOX 2513	WEVOPOX 2315	WEVOSIL 20200 A	WEVOSIL 22006 FL A	WEVOSIL 22102 FL A	WEVOSIL 22105 FL A
Resin / component B		WEVONAT 385	WEVONAT 300 RE	WEVONAT 900 E	WEVONAT 300	WEVONAT 300	WEVONAT 507	WEVONAT 300 RE	WEVODUR 5004	WEVODUR 5001	WEVODUR 1018/25	WEVODUR 1003/07	WEVODUR 42 M	WEVOSIL 20200 B	WEVOSIL 22006 FL B	WEVOSIL 22102 FL B	WEVOSIL 22105 FL B
Mixing ratio (parts by weight)		100 : 26	100 : 14	100 : 16	100 : 20	100 : 19	100 : 23	100 : 15	100 : 20	100 : 10	100 : 29	100 : 13	100 : 35	1 : 1	1 : 1	1 : 1	1 : 1
Mixed viscosity at 22 °C [mPa·s]	Rotational viscometer	1,200–2,000	1,000–1,800	900–1,400	1,000–1,300	2,100–2,400	500–1,500	1,300–1,800	3,400–4,000	3,500–6,500	3,000–5,000	3,000–6,000	2,600–3,000	300–700	2,000–2,800	1,700–3,300	3,000–5,000
Reactivity at 22 °C [min.]*		5–40	30–40	40–60	5–50	30–40	35–45	10–50	120	180–240	30 (120 °C)	30 (120 °C)	60 (120 °C)	50–60	90–120	50–70	50–70
Shore hardness A/D	DIN ISO 7619-1:2012-02	70–80 / --	-- / 40–50	89–85 / --	-- / 60–70	-- / 60–70	-- / 80–90	-- / 30–40	-- / 40–45	-- / 85–90	-- / 88–94	-- / 90–95	-- / 85–90	gel	47–55 / --	10–20 / --	10–20 / --
Operating temp. [°C]		-60 up to +125	-50 up to +165	-40 up to +130	-40 up to +130	-40 up to +130	-40 up to +145	-40 up to +135	-40 up to +130	-40 up to +180	-40 up to +160	-40 up to +180	-30 up to +160	-60 up to +180	-60 up to +180	-60 up to +180	-60 up to +200
E modulus [N/mm²]	DIN EN ISO 527-2:2012-06	15	110	20	55	–	10,300	20	40	6,000	8,600	11,000	6,300	–	4	0.5	0.4
Thermal conductivity [W/m·K]	DIN EN ISO 22007-2:2015-12	0.3	0.65	0.8	0.6	0.68	1.0	0.6	0.7	1.1	0.9	1.4	–	0.2	0.5	1	1.5
Glass transition temperature [°C]	TMA ISO 11359-2:1999-10	-60	-6	-7	15	20	75	-20	-10	51	90	52	75	-50	-50	-50	-45
Coefficient of expansion [ppm/K]	TMA ISO 11359-2:1999-10	65 < -70 °C 175 > -60 °C	42 < -10 °C 146 > 5 °C	60 < -10 °C 150 > 20 °C	58 < 10 °C 142 > 20 °C	52 < 10 °C 124 > 20 °C	55 < 70 °C 120 > 90 °C	50 < -30 °C 162 > 30 °C	61 < -40 °C 161 > 40 °C	40 < 30 °C 110 > 90 °C	40 < 80 °C 146 > 100 °C	29 < 40 °C 91 > 80 °C	49 < 75 °C 157 > 85 °C	480 > -30 °C	240 > -30 °C	181 > -30 °C	220 > -30 °C
Water absorption [%]	30 days, 22 °C	0.5	0.6	0.2	0.4	0.3	0.3	1.3	1.5	–	0.1	0.2	–	1.0	0.2	< 1.5	< 1.5
Flammability	UL 94	HB	V-0 1.6 mm**	V-0 6 mm**	V-0 1.5 mm**	V-0 1.5 mm**	V-0 1.5 mm**	V-0 6 mm**	V-0 6 mm**	V-0 2 mm**	V-0 6 mm**	HB	HB	HB	V-0 4 mm**	V-0 1 mm	V-0 6 mm
Railway fire standard	EN 45545-2	–	R22: HL2 R23: HL3	R22: HL2 R23: HL3	R22: HL2 R23: HL3	R22: HL3 R23: HL3	R22: HL3 R23: HL3	R22: HL2 R23: HL3	–	R22: HL2 R23: HL3	–	–	–	–	–	–	–
Dielectric strength [kV/mm]	DIN EN 60243-1:2014-01	23	30	> 20	29	> 20	28	> 20	–	25	33	20	3,2	23	33	> 25	> 20
Dielectric constant ε (at 50 Hz, 23 °C)	DIN EN IEC 62631-2-1:2018-12	3.0	5.7	5.1	5.6	5.6	4.2	7.8	7.8	4.3	3.8	4.8	4.6	–	3.8	4.5	6.1
Loss factor tan δ (at 50 Hz, 23 °C)	DIN EN IEC 62631-2-1:2018-12	0.080	0.040	0.160	0.117	0.120	0.010	0.090	0.180	0.006	0.014	0.016	0.0009	–	0.065	0.041	0.014

All application parameters refer to processing at room temperature. All mechanical, thermal and electrical properties are based on complete curing.
* The indicated range of pot life corresponds with current standard versions. Adjustment of pot life is possible.
** UL listing under file No. E108835
For a more detailed technical description of our systems please refer to the corresponding data sheets which are available for all 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.

Ask us about our materials compliant with the stringent fire and safety standard EN 45545-2 in hazardous levels HL2 and HL3 for requirements R22 and R23. A wide variety of products have self-extinguishing properties in line with UL 94 V-0.

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 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.

wevo

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