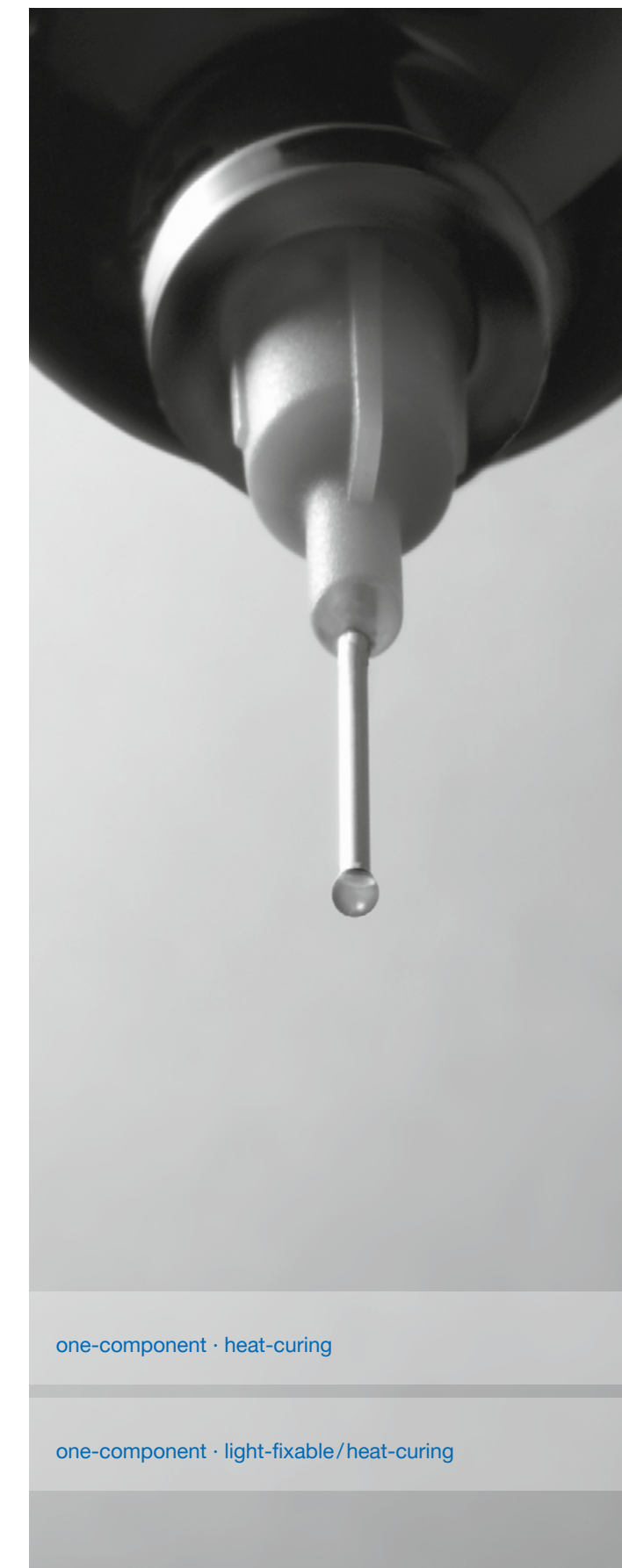


# DELO® MONOPOX, DELO DUALBOND® (light-fixable & heat-curing)

Area of use	Construction and structural adhesives				Potting compounds and encapsulants					Low-temperature-curing adhesives				Die attach adhesives			
Product group	DELO® MONOPOX			DELO DUALBOND®	DELO® MONOPOX				DELO DUALBOND®	DELO® MONOPOX		DELO DUALBOND®		DELO® MONOPOX		DELO DUALBOND®	
Product code	AD286	SJ2981	HT2860	SJ2718	GE2710	GE6515	GE727	GE785	GE7045	LT2224	LT2238	LT2208	LT354	DA255	DA587	DA2556	
Chemical basis	amin. epoxy	amin. epoxy	amin. epoxy	amin. epoxy	amin. epoxy	cation. epoxy	anhyd. epoxy	anhyd. epoxy	anhyd. epoxy	VLT	VLT	VLT	mCD	amin. epoxy	cation. epoxy	amin. epoxy	
Color of cured product, in 0.04 in (1 mm) layer thickness	silver-gray, opaque	beige, opaque	gray, opaque	beige, opaque	black, opaque, fluorescent	white, opaque	black, opaque	black, opaque	white, opaque	white, opaque, fluorescent	black, opaque	beige, opaque	black, opaque	gray, opaque	white, opaque	brown, opaque	
Filler	aluminum	minerals	aluminum	–	–	minerals	minerals	minerals	minerals	minerals	minerals	–	minerals	–	–	–	
Density [g/cm³] at room temperature	1.4	1.6	1.6	1.2	1.2	1.8	1.9	1.7	1.8	1.2	1.4	1.3	1.3	1.3	1.5	1.2	
Viscosity [cP = mPa·s] at +73 °F (+23 °C), rheometer	shear rate 2 1/s	240,000	830,000	250,000	42,000	11,000	19,000	27,000	600,000	130,000	70,000	48,000	2,400	610,000	78,000	76,000	55,000
	shear rate 10 1/s	140,000	340,000	110,000	24,000	8,000	10,000	18,000	180,000	28,000	20,000	21,000	1,500	145,000	33,000	31,000	30,000
Light fixation time [s] at 400 nm, 200 mW/cm²	–	–	–	<5	–	–	–	–	5	–	–	<5	<5	–	–	<2	
Processing time at +73 °F (+23 °C), 50 % r.h.	4 weeks	4 weeks	4 weeks	3 weeks	2 weeks	1 week	24 h	48 h	24 h	24 h	72 h	72 h	72 h	72 h	120 h	72 h	
Min. curing temperature	+266 °F (+130 °C)	+248 °F (+120 °C)	+266 °F (+130 °C)	+194 °F (+90 °C)	+212 °F (+100 °C)	+194 °F (+90 °C)	+257 °F (+125 °C)	+257 °F (+125 °C)	+257 °F (+125 °C)	+140 °F (+60 °C)	+140 °F (+60 °C)	+140 °F (+60 °C)	+176 °F (+80 °C)	+194 °F (+90 °C)	+248 °F (+120 °C)	+194 °F (+90 °C)	
Heat curing air convection oven, without heating time	75 min @ +266 °F (+130 °C) 40 min @ +302 °F (+150 °C)	40 min @ +302 °F (+150 °C)	40 min @ +302 °F (+150 °C)	20 min @ +266 °F (+130 °C)	30 min @ +266 °F (+130 °C)	15 min @ +266 °F (+130 °C)	90 min @ +257 °F (+125 °C) 20 min @ +302 °F (+150 °C)	90 min @ +257 °F (+125 °C) 20 min @ +302 °F (+150 °C)	30 min @ +302 °F (+150 °C)	30 min @ +140 °F (+60 °C)	30 min @ +140 °F (+60 °C)	90 min @ +140 °F (+60 °C) 15 min @ +194 °F (+90 °C)	30 min @ +176 °F (+80 °C) 10 min @ +212 °F (+100 °C)	8 min @ +248 °F (+120 °C) 2 min @ +302 °F (+150 °C)	5 min @ +266 °F (+130 °C) 2 min @ +302 °F (+150 °C)	60 min @ +194 °F (+90 °C) 15 min @ +266 °F (+130 °C)	
Temperature range of use	–67 to +392 °F (–55 to +200 °C)	–67 to +392 °F (–55 to +200 °C)	–67 to +428 °F (–55 to +220 °C)	–40 to +356 °F (–40 to +180 °C)	–40 to +356 °F (–40 to +180 °C)	–40 to +392 °F (–40 to +200 °C)	–85 to +356 °F (–65 to +180 °C)	–85 to +356 °F (–65 to +180 °C)	–85 to +356 °F (–65 to +180 °C)	–40 to +302 °F (–40 to +150 °C)	–40 to +302 °F (–40 to +150 °C)	–40 to +302 °F (–40 to +150 °C)	–40 to +266 °F (–40 to +130 °C)	–40 to +356 °F (–40 to +180 °C)	–40 to +302 °F (–40 to +150 °C)	–40 to +356 °F (–40 to +180 °C)	
Glass transition temperature T <sub>g</sub>	DMTA	+266 °F (+130 °C)	+273 °F (+134 °C)	+334 °F (+168 °C)	+259 °F (+126 °C)	+199 °F (+93 °C)	+311 °F (+155 °C)	–	–	–	+77 °F (+25 °C)	+133 °F (+56 °C)	+91 °F (+33 °C)	–	–	+289 °F (+143 °C)	
	TMA	–	–	–	–	–	–	+291 °F (+144 °C)	+360 °F (+182 °C)	+385 °F (+196 °C)	–	–	–	+176 °F (+80 °C)	+282 °F (+139 °C)	+162 °F (+72 °C)	–
Compression shear strength DELO® Standard 5	Al/Al	7,540 psi (52 MPa)	8,265 psi (57 MPa)	9,425 psi (65 MPa)	8,700 psi (60 MPa)	9,865 psi (68 MPa)	5,945 psi (41 MPa)	2,175 psi (15 MPa)	2,900 psi (20 MPa)	–	1,740 psi (12 MPa)	4,350 psi (30 MPa)	2,900 psi (20 MPa)	3,770 psi (26 MPa)	6,960 psi (48 MPa)	–	6,960 psi (48 MPa)
	FR4/FR4	–	–	–	–	10,445 psi (72 MPa)	3,625 psi (25 MPa)	7,830 psi (54 MPa)	7,250 psi (50 MPa)	6,670 psi (46 MPa)	–	5,075 psi (35 MPa)	3,625 psi (25 MPa)	5,220 psi (36 MPa)	–	–	7,975 psi (55 MPa)
	PPS/PPS	–	–	3,190 psi (22 MPa)	3,915 psi (27 MPa)	3,190 psi (22 MPa)	–	3,625 psi (25 MPa)	–	3,045 psi (21 MPa)	–	–	–	–	–	–	–
Tensile shear strength Al/Al sand-blasted by the criteria of DIN 1465	at rt	4,785 psi (33 MPa)	3,625 psi (25 MPa)	3,190 psi (22 MPa)	2,900 psi (20 MPa)	3,190 psi (22 MPa)	–	–	–	–	1,595 psi (11 MPa)	–	–	–	–	–	
	at +302 °F (+150 °C)	870 psi (6 MPa)	1,160 psi (8 MPa)	2,610 psi (18 MPa)	580 psi (4 MPa)	–	2,900 psi (20 MPa)	–	–	–	–	–	–	–	–	–	
Tensile strength by the criteria of DIN EN ISO 527	–	9,280 psi (64 MPa)	10,300 psi (71 MPa)	10,010 psi (69 MPa)	9,570 psi (66 MPa)	10,155 psi (70 MPa)	8,700 psi (60 MPa)	8,555 psi (59 MPa)	7,975 psi (55 MPa)	7,250 psi (50 MPa)	725 psi (5 MPa)	8,120 psi (56 MPa)	3,190 psi (22 MPa)	2,175 psi (15 MPa)	5,800 psi (40 MPa)	4,785 psi (33 MPa)	4,785 psi (33 MPa)
Elongation at tear [%] by the criteria of DIN EN ISO 527	–	3	2	3	3	3	<1	<1	<1	<1	90	2	70	20	1	19	1
Young's modulus	by the criteria of DIN EN ISO 527	551.1 ksi (3,800 MPa)	797.7 ksi (5,500 MPa)	638.2 ksi (4,400 MPa)	–	–	1,885.5 ksi (13,000 MPa)	1,784 ksi (12,300 MPa)	1,595.4 ksi (11,000 MPa)	1,392.4 ksi (9,600 MPa)	–	–	26.1 ksi (180 MPa)	72.5 ksi (500 MPa)	–	203.1 ksi (1,400 MPa)	464.1 ksi (3,200 MPa)
	DMTA	–	–	–	580.2 ksi (4,000 MPa)	420.6 ksi (2,900 MPa)	–	–	–	–	14.5 ksi (100 MPa)	826.7 ksi (5,700 MPa)	–	–	464.1 ksi (3,200 MPa)	–	–
Shore hardness by the criteria of DIN EN ISO 868	–	D 80	D 89	D 86	D 85	D 81	D 92	D 87	D 89	D 90	A 76	D 84	D 69	D 72	D 86	D 78	D 80
Coefficient of linear expansion [ppm/K] TMA, DELO® Standard 26	below T <sub>g</sub>	61	35	50	68	70	23	11	22	20	73	46	57	150	58	94	65
	above T <sub>g</sub>	187	153	148	175	193	48	43	–	–	188	161	185	179	170	168	181
Shrinkage [vol. %] DELO® Standard 26	–	2.50	2.00	1.50	3.00	3.00	–	1.20	1.40	–	3.80	4.00	4.90	2.40	1.70	3.80	2.90
Water absorption [weight %] by the criteria of DIN EN ISO 62	–	0.18	0.14	0.20	0.20	0.10	0.10	0.10	0.10	–	0.60	0.10	0.20	0.20	0.20	0.50	0.20
Storage life	–	6 months @ +32 to +50 °F (0 to +10 °C)	6 months @ +32 to +50 °F (0 to +10 °C)	6 months @ +32 to +50 °F (0 to +10 °C)	6 months @ +32 to +50 °F (0 to +10 °C)	6 months @ +32 to +50 °F (0 to +10 °C)	6 months @ +32 to +50 °F (0 to +10 °C)	6 months @ –0.4 °F (–18 °C)	6 months @ –0.4 °F (–18 °C)	6 months @ –0.4 °F (–18 °C)	4 months @ –0.4 °F (–18 °C) (expected: 6 months)	6 months @ –0.4 °F (–18 °C)	6 months @ –0.4 °F (–18 °C)	6 months @ –0.4 °F (–18 °C)	6 months @ –0.4 °F (–18 °C)	6 months @ –0.4 °F (–18 °C)	
Special features of product	very high strength very high media resistance	high-strength connections with very high static and dynamic loads flow-resistant	very high temperature and media resistance	fast fixation of the components by light adjusted flow behavior	halogen-free good flow behavior especially for use in electronics	encapsulation of electronic components very high temperature and media resistance	fill very good flow behavior	dam flow-resistant	fast fixation strength glob top	curing at very low temperatures flexible	suitable for temperature-sensitive components	suitable for temperature-sensitive components	extremely fast fixation strength very steady shrinkage optimized for high-precision optical bonding	fast thermode curing possible (6 s @ +356 °F [+180 °C]) very good adhesion to FR4, gold, preplated leadframe, aluminum and LCP	ideal in combination with UV-curing chip encapsulants DELO® KATIOBOND®	very fast light fixation very good adhesion to FR4, gold, preplated leadframe, aluminum and LCP	

AD = Adhesive DA = Die Attach GE = General Encapsulant HT = High Temperature LT = Low Temperature SJ = Structural Joining



one-component · heat-curing

one-component · light-fixable / heat-curing

## CONTACT

**DELO** Industrial Adhesives  
Headquarters

► **Germany** · Windach / Munich



- **China** · Shanghai
- **Japan** · Yokohama
- **Malaysia** · Kuala Lumpur
- **Singapore**
- **South Korea** · Seoul
- **Taiwan** · Taipei
- **Thailand** · Bangkok
- **USA** · Sudbury, MA

[www.DELO-adhesives.com](http://www.DELO-adhesives.com)

Our selection charts / material selection guides are a technical selection aid giving an overview of various product variants. We will be pleased to provide you with sales details, such as available container sizes, stock availability and minimum order quantities, on request.

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.

© DELO® - This brochure including any and all parts is protected by copyright. Any use not expressly permitted by the Urheberrechtsgesetz (German Copyright Act) shall require DELO®'s written consent. This shall apply without limitation to reproductions, duplications, disseminations, adaptations, translations and microfilms as well as to the recording, processing, duplication and / or dissemination by electronic means.

04/19

ADHESIVES

DISPENSING

CURING

CONSULTING

**DELO**

### FURTHER INFORMATION ON THE PRODUCTS

can be found in the Technical Data Sheets, Material Safety Data Sheets and Instructions for Use at [www.DELO-adhesives.com/en/downloads](http://www.DELO-adhesives.com/en/downloads).

For application tests and any question you might have regarding the use of DELO® products, please do not hesitate to contact our Engineering Department.

## SELECTION CHART

**DELO® MONOPOX**

**DELO DUALBOND®**