DELO® MONOPOX

Aminic epoxy resins

Application area		Constructional and structural adhesives							Low-temperature curing		Casting resins		Die attach		Anisotropic conductive adhesives (ACA)	
Product code		**1197**	**AD066**	**AD286**	**AD295**	**HT281**	**HT282**	**SJ2720**	**LT204**	**LT2224**	**6093**	**6095**	**DA255**	**NU257**	**AC245**	**AC268**
Color cured product		silver gray	beige	silver gray	light beige	light gray	silver gray	beige	black	white fluorescent	black	black	gray	white	gray	black
Filler		aluminum	unfilled	aluminum	minerals	minerals	aluminum	unfilled	minerals	minerals	unfilled	unfilled	unfilled	unfilled	nickel	nickel
Density [g/cm³] at room temperature		1.4	1.2	1.4	1.6	1.57	1.57	1.17	1.53	1.2	1.2	1.2	1.34	1.1	1.48	1.51
Viscosity [cP = mPas] at +73 °F (+23 °C)		pasty	20,000	110,000	230,000	125,000	125,000	14,000	20,000	20,000	31,000	50,000	25,000	29,000	33,000	32,000
Curing time Time/T	air convection oven	40 min/+302 °F (+150 °C) 15 min/+356 °F (+180 °C)	20 min/+266 °F (+130 °C)	75 min/+266 °F (+130 °C) 40 min/+302 °F (+150 °C) 15 min/+356 °F (+180 °C)	40 min/+302 °F (+150 °C)	40 min/+302 °F (+150 °C) also suitable for fast induction curing		20 min/+266 °F (+130 °C)	90 min/+140 °F (+60 °C) 15 min/+194 °F (+90 °C)	30 min/+140 °F (+60 °C)	30 min/+266 °F (+130 °C)	30 min/+266 °F (+130 °C)	8 min/+248 °F (+120 °C) 2 min/+302 °F (+150 °C)	20 min/+284 °F (+140 °C)	–	–
	thermode	–	–	–	–	–	–	–	–	–	–	–	6 s/+356 °F (+180 °C)	8 s/+356 °F (+180 °C)	8 s/+356 °F (+180 °C) 6 s/+392 °F (+200 °C)	8 s/+338 °F (+170 °C) 6 s/+374 °F (+190 °C)
Min. curing temperature		+266 °F (+130 °C)	+212 °F (+100 °C)	+266 °F (+130 °C)	+266 °F (+130 °C)	+266 °F (+130 °C)	+266 °F (+130 °C)	+212 °F (+100 °C)	+140 °F (+60 °C)	+140 °F (+60 °C)	+212 °F (+100 °C)	+212 °F (+100 °C)	+194 °F (+90 °C)	+212 °F (+100 °C)	+302 °F (+150 °C)	+302 °F (+150 °C)
Temperature range of use		−67 to +392 °F (−55 to +200 °C)	−40 to +356 °F (−40 to +180 °C)	−67 to +392 °F (−55 to +200 °C)	−40 to +392 °F (−40 to +200 °C)	−67 to +428 °F (−55 to +220 °C)	−67 to +428 °F (−55 to +220 °C)	−40 to +356 °F (−40 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 +302 °F (−40 to +150 °C)	−40 to +302 °F (−40 to +150 °C)
Temperature stability Al/Al sand-blasted	at +302 °F (+150 °C)	725 psi (5 MPa)	–	870 psi (6 MPa)	1,305 psi (9 MPa)	1,740 psi (12 MPa)	1,740 psi (12 MPa)	–	–	–	–	–	–	–	–	–
	at +392 °F (+200 °C)	–	–	435 psi (3 MPa)	435 psi (3 MPa)	580 psi (4 MPa)	580 psi (4 MPa)	–	–	–	–	–	–	–	–	–
Die shear strength		–	–	–	–	–	–	–	7,540 psi (52 MPa) Al/PET	–	–	–	7,615 psi (52.5 MPa) FR4	5,075 psi (35 MPa) Al/PET	10.73 ksi (74 MPa) Al/PET	4,785 psi (33 MPa) Al/PET
Glass transition temperature T_g		+284 °F (+140 °C) rheometer	+270 °F (+132 °C) rheometer	+266 °F (+130 °C) DMTA	+273 °F (+134 °C) rheometer	+302 °F (+150 °C) DMTA	+315 °F (+157 °C) DMTA	+239 °F (+115 °C) DMTA	+86 °F (+30 °C) TMA	+77 °F (+25 °C) DMTA	+199 °F (+93 °C) rheometer	+189 °F (+87 °C) rheometer	+282 °F (+139 °C) DMTA	+293 °F (+145 °C) DMTA	+300 °F (+149 °C) DMTA	+280 °F (+138 °C) DMTA
Compression shear strength Al/Al		–	8,700 psi (60 MPa)	7,540 psi (52 MPa)	–	7,975 psi (55 MPa)	7,105 psi (49 MPa)	5,945 psi (41 MPa)	3,915 psi (27 MPa)	1,740 psi (12 MPa)	–	–	6,960 psi (48 MPa)	5,220 psi (36 MPa)	–	–
Tensile shear strength		3,770 psi (26 MPa)	2,610 psi (18 MPa)	4,785 psi (33 MPa)	4,350 psi (30 MPa)	3,480 psi (24 MPa)	4,205 psi (29 MPa)	1,885 psi (13 MPa)	2,900 psi (20 MPa)	1,595 psi (11 MPa)	2,030 psi (14 MPa)	2,610 psi (18 MPa)	–	–	–	–
Tensile strength		5,800 psi (40 MPa)	6,525 psi (45 MPa)	9,280 psi (64 MPa)	7,250 psi (50 MPa)	9,570 psi (66 MPa)	8,700 psi (60 MPa)	3,770 psi (26 MPa)	2,900 psi (20 MPa)	725 psi (5 MPa)	5,945 psi (41 MPa)	6,525 psi (45 MPa)	5,800 psi (40 MPa)	–	–	–
Elongation at tear [%]		1.4	1.4	2.8	1.4	1.7	2	1	35	90	1.6	1.2	1.2	–	–	–
Young's modulus		478.5 ksi (3,300 MPa)	420.5 ksi (2,900 MPa)	551 ksi (3,800 MPa)	797.5 ksi (5,500 MPa)	826.5 ksi (5,700 MPa)	696 ksi (4,800 MPa)	420.5 ksi (2,900 MPa)	58 ksi (400 MPa)	14.5 ksi (100 MPa) DMTA	420.5 ksi (2,900 MPa)	551 ksi (3,800 MPa)	464 ksi (3,200 MPa)	595 ksi (4,100 MPa) DMTA	565.5 ksi (3,900 MPa) DMTA	536.5 ksi (3,700 MPa) DMTA
Shore hardness D		67	83	80	84	87	84	79	77	76 shore hardness A	74	83	86	87	85	83
Coefficient of linear expansion [ppm/K]	below T_g	65	66	61	42	50	55	86	43	73	59	65	58	60	55	60
	above T_g	171	189	187	147	148	142	194	149	188	183	183	170	172	180	170
Shrinkage [vol. %]		3.0	2.0	2.5	2.5	2.0	2.7	2.1	4.0	3.8	1.1	2.0	1.7	1.4	1.6	1.3
Water absorption [weight %] 24 h at rt		0.1	0.2	0.18	0.12	0.10	0.10	0.15	0.2	0.6	0.1	0.1	0.2	0.03	0.1	0.25
Dielectric strength [kV/mm]		2	–	5.2	20	22	–	–	–	–	18	–	–	–	–	–
Storage life	at rt, max. +77 °F (max. +25 °C)	6 weeks	4 weeks	4 weeks	4 weeks	4 weeks	4 weeks	2 weeks	72 h	24 h	6 weeks	6 weeks	72 h	1 week	1 week	72 h
	+32 °F to +50 °F (0 °C to +10 °C)	6 months	6 months	6 months	6 months	6 months	6 months	4 months	–	–	6 months	6 months	–	–	–	–
	−0.4 °F (−18 °C)	–	–	–	–	–	–	–	6 months	4 months	–	–	6 months	6 months	6 months	6 months
Product features		high run resistance	for fast, high-strength bonds	very high strength excellent media resistance	good flow behavior excellent media resistance	excellent media and temperature resistance	excellent media and temperature resistance high strength on nickel impact-resistant	fast curing at moderate temperatures high-strength bonds	curing at very low temperatures good adhesion to LCP	curing at very low temperatures flexible	good flow behavior	excellent media resistance low chloride ion content	fast thermode curing possible excellent adhesion to FR4, gold, preplated leadframe, Al, and LCP	fast thermode curing possible	fast thermode curing possible excellent adhesion to PET, FR4, copper, Al, silver	fast thermode curing possible
Typical application area		high-strength applications	good adhesion to many plastics excellent adhesion to PEEK	used in e-motors high-strength applications	high-strength applications	used in e-motors high-temperature applications		good adhesion to many plastics	camera bonding used for temperature-sensitive components		especially for electronic applications		bonding of bare semiconductors (ICs) to metal leadframes, rigid PCBs, and ceramic substrates	especially for electronic applications, smart labels, and smart cards	anisotropic electrical contacting of electronic components such as flip-chips	
		◄ especially for metal bonding ►														

AC = **A**nisotropic **C**onductive **AD** = **AD**hesive **DA** = **D**ie **A**ttach **HT** = **H**igh **T**emperature **LT** = **L**ow **T**emperature **NU** = **N**o Flow **U**nderfiller **SJ** = **S**tructural **J**oining

Product description

DELO® MONOPOX are one-component, heat-curing epoxy resins.

Standard temperature range

The DELO® MONOPOX epoxies are normally used in a temperature range of −67 °F to +428 °F (−55 °C to +220 °C).
Many product properties depend on the temperature and can change permanently, in particular at high temperatures. Therefore, it has to be checked before each use whether a certain adhesive is suitable for the temperatures in the required area of application.
Please see the Technical Data Sheet for more information on how our products react to temperatures.

Processing

The products are normally delivered ready for use. They are applied directly from the container or using dispensing units.

Curing

DELO® MONOPOX products require temperatures > +140 °F (+60 °C) for curing. The heating time of the components must be added to the curing time. Heating can be done for example in air convection ovens, with IR radiators or using inductive systems.

Surface pretreatment

To achieve optimum bond strength, the surfaces must be free from dust, oil, grease, separating agents and other contaminations. For cleaning, we recommend using cleaners from the DELOTHEN series.
After cleaning, the adhesion of the adhesive can be further enhanced by sand blasting, grinding or pickling the surface.

Storage life

After delivery, in the unopened original container:
see Technical Data Sheet of the product.

Use

DELO® MONOPOX products are used for high-strength bonding of components which are extremely stressed to some extent. These products are constructional elements. The adhesive selection is supposed to be optimized regarding component material, stresses, construction and processing technology. Application areas are mainly found in automotive and automotive supplier industry, mechanical and electrical engineering, electronics, plant construction, construction technology, energy and environmental technology.

Further information

More type-specific properties are included in the Technical Data Sheets, Material Safety Data Sheets and Instructions for Use.
For application tests and any question you might have regarding the use of DELO® products, please do not hesitate to contact our Engineering Department.

Application examples

- **High-strength bonding, alternative to soldering**
  For example bonding of carbide or steel, structural bonding in vehicle and steel construction
  → DELO® MONOPOX 1197
  → DELO® MONOPOX AD286
  → DELO® MONOPOX AD295

- **Use at high temperatures**
  → DELO® MONOPOX HT281
  → DELO® MONOPOX HT282

- **High run resistance**
  → DELO® MONOPOX 1197

- **Casting of electronic components**
  → DELO® MONOPOX 6093
  → DELO® MONOPOX 6095
  low chloride ion content, improved corrosion properties

- **Fast curing**
  → DELO® MONOPOX AD066
  → DELO® MONOPOX SJ2720

- **Low-temperature curing**
  → DELO® MONOPOX LT2224

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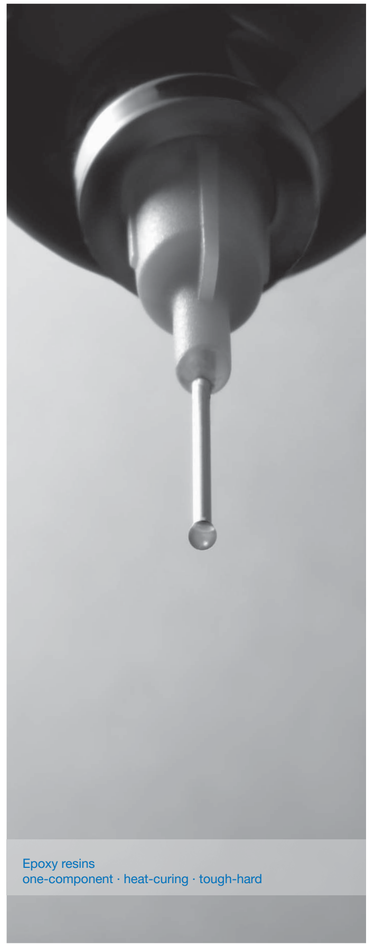

SELECTION CHART

DELO® MONOPOX Aminic

Epoxy resins
one-component · heat-curing · tough-hard