Curing of photoinitiated adhesives

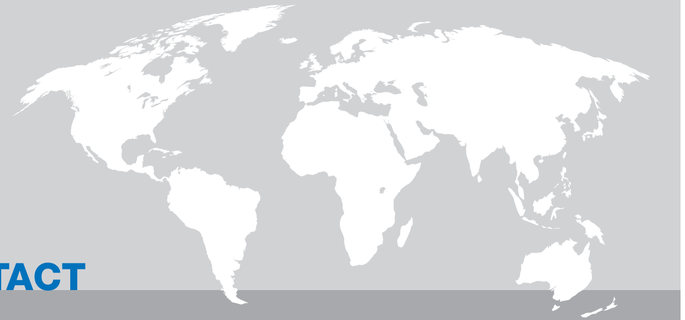
Curing with UV light or visible light in the respective wavelength range. DELOLUX LED curing lamps are especially suitable as per the chart below. All standard DELOLUX HID discharge lamps are also suitable.

Lamp type	DELOLUX 80, DELOLUX 50 and 502, DELOLUX 20 and 202		
	365	400	460
DELO DUALBOND AD465	+	++	–
DELO DUALBOND GE4707	+	++	–
DELO DUALBOND GE4906	+	++	–
DELO DUALBOND GE4910	+	++	–
DELO DUALBOND GE4919	+	++	–
DELO DUALBOND GE4949	+	++	–
DELO DUALBOND MF4992	+	++	–
DELO DUALBOND AD4930	+	++	–
DELO DUALBOND AD4950	+	++	–

++ particularly suitable + suitable – not suitable

Product selection

Application area	Potting/encapsulation Coating	Bonding of UVA- and VIS-permeable materials	Bonding of VIS-permeable materials	Bonding of opaque materials	Bonding, potting, encapsulation, coating with reliable curing in shadowed areas
Products	DELO KATIOBOND, DELO PHOTOBOND	DELO KATIOBOND, DELO PHOTOBOND	Light-activated DELO KATIOBOND, light-curing DELO PHOTOBOND	Light-activated DELO KATIOBOND, light-activated humidity-curing DELO PHOTOBOND LA	DELO DUALBOND
Processing suggestion	Application ↓ Irradiation	Application ↓ Joining ↓ Irradiation		Application ↓ Preactivation ↓ Joining	Application ↓ Joining ↓ Irradiation and/or heat or air humidity



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DELO

SELECTION CHART

DELO DUALBOND

Acrylates
one-component ·
UV-/light-/heat-curing · UV-/light-/humidity-curing

DELO DUALBOND photoinitiated-curing acrylates

		UV-/light-/heat-curing		UV-/light-/humidity-curing						
Product code		**AD465**	**GE4707**	**GE4906**	**GE4910**	**GE4919**	**GE4949**	**MF4992**	**AD4930**	**AD4950**
Application area	B = bonding, S = sealing	B/S	S	S	B/S	B	B	B	B	B
Color of cured product	in 0.1 mm layer thickness	red fluorescent	blue fluorescent	yellowish-emitting	colorless clear	yellowish	anthracite gray	red fluorescent	yellowish	colorless
	in 1.0 mm layer thickness	–	blue fluorescent	–	–	yellowish slightly milky	black	–	–	–
Viscosity [mPas] at +23 °C	rheometer; SR = shear rate	6,500 SR 10/s	1,500 SR 2/s	2,200 SR 10/s	2,300 SR 2/s	11,000 SR 2/s	–	100,000 SR 2/s	14,000 SR 2/s	25,400 SR 2/s
	Brookfield, DIN EN 12092	24,000	1,500	–	2,000	–	35,000	215,000	–	36,000
Wavelength range for curing [nm]		320 – 420	← 320 – 450 →							
Recommended irradiation time [s] LED 400 nm, LED intensity 200 mW/cm²		2	7	7	4	4	10	13	3	4
Curing time until final strength		5 min @ +110 °C 3 min @ +130 °C	50 min @ +120 °C 25 min @ +130 °C	–	–	–	–	–	–	–
Compression shear strength [MPa] DELO Standard 5	glass/glass	23 [1]	–	–	7 [1]	15 [3]	10 [3]	9 [4]	9 [1]	9 [1]
	glass/Al	22 [1]	–	–	6 [1]	20 [3]	7 [4]	8 [4]	4 [1]	6 [1]
	glass/stainless steel	19 [1]	4 [2]	2 [2]	–	–	–	6 [4]	–	–
	glass/PA	14 [1]	5 [2]	2 [2]	6 [1]	10 [3]	10 [3]	8 [4]	8 [1]	8 [1]
	glass/PBT	5 [1]	–	1 [2]	2 [1]	–	4 [3]	4 [4]	4 [1]	4 [1]
	glass/FR4	21 [1]	–	–	9 [1]	–	–	9 [4]	9 [1]	11 [1]
	PC/PC	–	5 [2]	–	–	20 [3]	7 [4]	8 [4]	–	–
	PMMA/PMMA	–	–	–	–	–	–	–	7 [1]	8 [1]
Tensile strength [MPa]	by the criteria of DIN EN ISO 527	17	5	3	6	15	–	8	5	8
Elongation at tear [%]	by the criteria of DIN EN ISO 527	220	460	500	315	110	–	350	45	270
Young's modulus [MPa]		320 DIN EN ISO 527	–	< 100 DIN EN ISO 527	17 DIN EN ISO 527	–	118 DMTA	< 100 DIN EN ISO 527	30 DIN EN ISO 527	45 DIN EN ISO 527
Shore hardness	by the criteria of DIN EN ISO 868	D 50	A 36	A 24	A 62	D 40	A 85	A 58	A 80	A 77
Glass transition temperature T_g [°C]		+100 rheometer	–	+10 rheometer	+24 rheometer	+110 DMTA	–	+66 DMTA	+80 DMTA	+72 DMTA
Average coefficient of linear expansion [ppm/K] in the temperature range [°C]	TMA	–	–	225 +40 to +60	235 +30 to +140	–	–	–	210 +30 to +140	217 +30 to +140
Shrinkage [vol. %]	DELO Standard 13	5.6	6.5	5.6	5.4	7	4.6	4.3	3	4.6
Water absorption [weight %]	by the criteria of DIN EN ISO 62 24 h at +23 °C	1.2	0.8	1.1	1.3	3	5.8	2.8	0.6	2.5
Special features of product		dry surface very fast curing very good plastic/metal adhesion	good flow behavior well suitable for sealing applications high temperature resistance	well suitable for potting, encapsulation and sealing applications highly flexible high temperature resistance	well suitable for potting, encapsulation and sealing applications flexible high temperature resistance	multi-purpose adhesive dry surface	multi-purpose adhesive opaque good plastic adhesion	multi-purpose adhesive high temperature resistance good plastic/metal adhesion flexible	multi-purpose adhesive good corrosion resistance good shadow strength 2 – 3 MPa	multi-purpose adhesive good plastic adhesion

Compression shear strength – irradiation and curing conditions:
[1] UVA intensity 55 – 60 mW/cm², 60 s
[2] LED 400 nm, LED intensity 200 mW/cm², 60 s
[3] LED 400 nm, LED intensity 200 mW/cm², 30 s
[4] LED 400 nm, LED intensity 60 mW/cm², 60 s

AD = **AD**hesive **GE** = **G**eneral **E**ncapsulant **MF** = **M**ulti **F**unction

Product description

DELO DUALBOND are one-component, solvent-free acrylate-based adhesives.

Usual temperature range

DELO DUALBOND acrylates are normally used in a temperature range of –40 °C to +120 °C (or +150 °C, see special features of product "high temperature resistance").
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 processed directly from the container or using dispensing units.

Curing

Primary curing of the UV-/light- and humidity-curing acrylates DELO DUALBOND can only be achieved if the complete adhesive is reached by light of the suitable wavelength and sufficient intensity for the required period of time.
Adhesive in shadowed areas crosslinks through a second curing mechanism. This that no adhesive remains liquid in shadowed areas. Secondary curing proceeds through a reaction with air humidity or the remaining humidity on the components to be bonded. The curing speed is approx. 2 mm/24 h at 50 % rel. humidity and +23 °C.
Primary curing by light is absolutely necessary for a professional bonding as curing by humidity does not show any considerable strength build-up.
UV-/light- and heat-curing DELO DUALBOND products can be cured by both heat and light. Complete curing by light can only proceed if the total adhesive is reached by light of the suitable wavelength. Adhesive not reached by light can be completely cured by subsequent heat input. Irradiation times, curing temperatures and times are product-specific and can be found in the appropriate Technical Data Sheet.

Surface pretreatment

For optimal bond strength, the surfaces to be bonded must be free of dust, oil, grease, separating agents and other contaminations.
After cleaning, adhesion can be further improved by surface sand blasting, flaming, plasma treatment or corona treatment.

Preservability

After delivery, most DELO DUALBOND products are preservable for 6 months if stored in the unopened original container at room temperature.
You can find detailed information in the Technical Data Sheet of the product.

Use

It is the user's responsibility to test the suitability and strength of the adhesive on original components for the intended purpose by considering all specific requirements.
DELO DUALBOND products are predominantly used in electronics, microelectronics, electrical engineering, optics and precision engineering for bonding, coating, fixing and sealing.

Notes

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 the DELO Engineering.
Please also refer to the DELO PHOTOBOND and DELO KATIOBOND Selection Charts.
DELO PHOTOBOND are also photoinitiated, one-component and solvent-free, acrylate-based adhesives. They can be cured very quickly until final strength by irradiation with UV light or visible light (VIS).
DELO KATIOBOND are photoinitiated, one-component and solvent-free adhesives based on cationic-polymerizing epoxy resins. The adhesives cure until final strength after a minimum irradiation time even after irradiation is stopped. As a result, the light-activated types offer the possibility of preactivation. With this procedure two opaque components can be bonded. UV-curing DELO KATIOBOND can be used as Dam&Fill products for chip encapsulation. All DELO KATIOBOND products have a completely dry surface after curing.