

## Curing of photoinitiated adhesives

Curing with UV light or visible light in the specific wavelength range. DELOLUX LED curing lamps are especially suitable as per the chart below.

All standard DELOLUX HID lamps are also suitable. For preactivation, only visible light in a wavelength range from 400 to 550 nm can be used.

Lamp type	DELOLUX 80, DELOLUX 50 and 502, DELOLUX 20 and 202		
	365	400	460
DELO DUALBOND AD761	++	+	-
DELO DUALBOND OB749	++	+	-
DELO DUALBOND OB786	++	-	-
DELO DUALBOND OB6268	++	-	-
DELO KATIOBOND 4552	+*	+	++
DELO KATIOBOND KB554	+*	+	++
DELO KATIOBOND 4594	+*	+	++
DELO KATIOBOND 45952	+*	+	++
DELO KATIOBOND GE680	++	-	-

++ especially suitable + suitable - not suitable \* suitable only for direct irradiation, preactivation not possible

## 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 ↓ Preactivation ↓ Joining	Application ↓ Joining ↓ Irradiation and/or heat or air humidity

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- **Thailand** · Bangkok
- **USA** · Sudbury, MA

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.

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ADHESIVES

DISPENSING

CURING

CONSULTING

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## SELECTION CHART

**DELO KATIOBOND**

Epoxy resins  
one-component · UV-curing · UV-/light-curing · light-activated

**DELO DUALBOND**

Epoxy resins  
one-component · UV-/light-/heat-curing

# Photoinitiated-curing epoxy resins

Product group/curing class	DELO DUALBOND				DELO KATIOBOND					
	UV-/light-/heat-curing				light-activated, UV-/light-curing				UV-curing, UV-/light-curing	
Product code	AD761	OB749	OB786	OB6268	4552	KB554	4594	45952	GE680	
Application area	B=bonding, S=sealing, C=coating									
Color cured product	in 0.1 mm layer thickness	yellowish transparent	white translucent	whitish translucent	colorless transparent <sup>3)</sup>	brown transparent	yellow fluorescent	brown transparent	brown transparent fluorescent	whitish translucent
	in 1.0 mm layer thickness	yellowish translucent	whitish translucent	n. d.	yellowish transparent	brown transparent	yellow fluorescent	brown transparent	brown transparent fluorescent	whitish opaque
Density [g/cm³]	DELO Standard 13 at room temperature (+23 °C)	1.14	1.48	1.60	1.43	1.10	1.10	1.10	1.10	1.80
Viscosity [mPas]	rheometer Anton Paar, shear rate 10 1/s at room temperature (+23 °C)	5,500	2,700	32,000	27,000	1,200	1,500	5,000	6,000	70,000
Curing/irradiation	UV or visible light from 320 to 420 nm or with heat	UV or visible light from 320 to 440 nm or with heat	← UV light from 320 to 380 nm or with heat →		← UV or visible light from 320 to 550 nm →				UV light from 320 to 380 nm	
Recommended preactivation time [s] LED 460 nm, intensity 200 mW/cm², DELOLUXcontrol	DELO Standard 19	–	–	–	3	7	3	8	–	
Minimum irradiation time [s] LED lamp, intensity: 200 mW/cm², DELOLUXcontrol	DELO Standard 37	8	6	4	8	12	21	10	21	4
Recommended irradiation time [s] LED lamp, intensity: 200 mW/cm², DELOLUXcontrol		25	20	15	60	60	60	60	30	
Curing time with heat [min] without heating time of the components, at +130 °C		5	15	10	15	–	–	–	–	
Curing time until final strength [h]	← 24 →									
Curable layer thickness [mm]	DELO Standard 20	2	0.6	0.76	1.2	> 4	> 4	> 4	> 4	4
Compression shear strength [MPa] DELO Standard 5 after 24 h at room temperature (approx. +23 °C)	glass/glass	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>
	glass/Al	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>
	glass/FR4	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>1)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	16 <sup>2)</sup>
	glass/LCP	3 <sup>1)</sup>	n. d.	n. d.	n. d.	7 <sup>2)</sup>	7 <sup>2)</sup>	9 <sup>2)</sup>	6 <sup>2)</sup>	7 <sup>2)</sup>
	glass/PBT	5 <sup>1)</sup>	n. d.	n. d.	n. d.	15 <sup>2)</sup>	13 <sup>2)</sup>	11 <sup>2)</sup>	7 <sup>2)</sup>	11 <sup>2)</sup>
	PC/Al	6 <sup>1)</sup>	n. d.	n. d.	12 <sup>3)</sup>	6 <sup>2)</sup>	7 <sup>2)</sup>	8 <sup>2)</sup>	10 <sup>2)</sup>	n. d.
	PC/PC 400 nm	n. d.	36 <sup>1)</sup>	39 <sup>3)</sup>	33 <sup>3)</sup>	37 <sup>2)</sup>	11 <sup>2)</sup>	29 <sup>2)</sup>	15 <sup>2)</sup>	n. d.
Tensile strength [MPa]	by the criteria of DIN EN ISO 527 after 24 h at room temperature (≈ +23 °C)	23 <sup>1)</sup>	41	34	46	24	16	31	30	41
Elongation at tear [%]	by the criteria of DIN EN ISO 527 after 24 h at room temperature (≈ +23 °C)	84 <sup>1)</sup>	0.9	0.9	1	3	45	4	86	0.6
Young's modulus [MPa]	DMTA	1,000	n. d.	7,500	6,300	1,800	1,200	2,300	1,100	6,900 DIN EN ISO 527
Shore hardness D	by the criteria of DIN EN ISO 868 after 24 h at room temperature (≈ +23 °C)	58	81	92	88	58	51	69	44	91
Glass transition temperature T <sub>g</sub> [°C]	DMTA, 2nd run at room temperature (≈ +23 °C)	+48	+154	+179	+202	+153	+43	+134	+39	+120
Coefficient of linear expansion [ppm/K] DELO Standard 26, TMA	α <sub>1</sub>	86 (−40 °C to −10 °C)	44 (+25 °C to +60 °C)	38 (+30 °C to +80 °C)	37 (−40 °C to +20 °C)	120 (+40 °C to +54 °C)	209 (+30 °C to +150 °C)	123 (+30 °C to +55 °C)	200 (+30 °C to +145 °C)	33 (+30 °C to +150 °C)
	α <sub>2</sub>	201 (+40 °C to +150 °C)	113 (+120 °C to +150 °C)	53 (+130 °C to +150 °C)	78 (+135 °C to +170 °C)	173 (+130 °C to +162 °C)	n. d.	175 (+110 °C to +170 °C)	n. d.	n. d.
Shrinkage [vol. %]	DELO Standard 13 at room temperature (+23 °C)	3.0	2.2	1.6	0.7	3.7	3.8	3.9	3.8	2
Water absorption [weight %]	by the criteria of DIN EN ISO 62 after 24 h at room temperature (≈ +23 °C)	0.3	0.1	0.08	0.24	1.15	1	1	0.9	0.1
Specific volume resistance [Qcm]	VDE 0303, part 3	> 1 × 10 <sup>13</sup>	n. d.	n. d.	n. d.	> 1 × 10 <sup>13</sup>	> 1 × 10 <sup>13</sup>	> 1 × 10 <sup>13</sup>	> 1 × 10 <sup>13</sup>	> 1 × 10 <sup>13</sup>
Surface resistance [Ω]	VDE 0303, part 3	> 1 × 10 <sup>13</sup>	n. d.	n. d.	n. d.	> 1 × 10 <sup>13</sup>	> 1 × 10 <sup>13</sup>	> 1 × 10 <sup>13</sup>	> 1 × 10 <sup>12</sup>	> 1 × 10 <sup>13</sup>
Dielectric constant	1 MHz	3.5	n. d.	n. d.	n. d.	3.9	4.0	3.9	4.3	3.5
	1 GHz	3.0	n. d.	n. d.	n. d.	3.2	3.2	3.2	3.2	3.2

<sup>1)</sup> Curing: combination of light and heat n. d. = not determined

<sup>2)</sup> Curing: light

<sup>3)</sup> Curing: heat

AD = ADhesive GE = General Encapsulant KB = KATIOBOND OB = Optical Bonding

## Product description

DELO KATIOBOND and DELO DUALBOND are one-component, solvent-free adhesives based on epoxy resins.

DELO KATIOBOND and DELO DUALBOND are cured to their initial strength in seconds by irradiating them with UVA or visible light (VIS). The products of both adhesive families cure to final strength even after removing the light source.

DELO DUALBOND products can also be cured by heat addition. This is advantageous where the adhesive cannot be reached by light at all or only insufficiently, e.g., in shadowed areas. Both curing mechanisms can be used independently.

## Standard temperature range

DELO KATIOBOND and DELO DUALBOND products are normally used in a temperature range of −40 °C to +150 °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 KATIOBOND products require an irradiation time of 5 – 60 s. To reach initial strength, we recommend an irradiation time of 15 – 60 s. Longer irradiation times, higher intensities or higher temperatures accelerate curing. The adhesive cures to final strength at room temperature without further irradiation.

Preactivation method for one opaque component: light-activated DELO KATIOBOND adhesives are typically activated with short irradiation times of 2 – 6 s. The adhesive remains liquid within an open time of 10 – 30 s so that a second component can be joined. Then, the adhesive cures to final strength at room temperature.

UV-curing DELO KATIOBOND products become gel-like very quickly when being irradiated and can virtually not be preactivated. In addition to light curing, DELO DUALBOND products can also be cured in areas not accessible to light by heat addition. After adhesive dispensing or joining, the components are heated to at least +80 °C. DELO DUALBOND products cure in 5 min at the preferred temperature of +130 °C. The light and heat curing mechanisms can be used independently as well as in combination. Thus, it is possible to light-cure the DELO DUALBOND adhesives fast in the areas accessible to light and heat-cure them afterwards to reliably cure shadowed areas.

The curing, preactivation and open times mentioned are based on tests according to DELO Standards with defined techniques, equipment and specimens. The irradiation times can deviate accordingly in practice. They can be particularly influenced by irradiation intensity and temperature when using certain components. The curing time decreases with increasing temperature and/or irradiation intensity. The preactivation and open times also decrease accordingly. DELO KATIOBOND and DELO DUALBOND have a completely dry surface after curing. Therefore, they can also be used for casting and coating applications.

## Surface pretreatment

To achieve optimum bond strength, the surfaces must be free from dust, oil, grease, separating agents and other contaminations. Highly alkaline surfaces can inhibit adhesive curing – resulting in an only moderate build-up of adhesion.

Adhesion can be improved by suitable pretreatment methods, such as sand blasting, flaming and plasma or corona treatment.

## Preservability

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

## 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.

Please also refer to the DELO PHOTOBOND Selection Chart.

DELO PHOTOBOND are also photoinitiated, one-component and solvent-free adhesives. Contrary to the cationic-curing epoxies DELO KATIOBOND, DELO PHOTOBOND are based on radical-curing acrylate resins and can be very quickly cured until final strength by UVA or visible light (VIS).