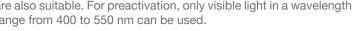
# **Curing of photoinitiated adhesives**

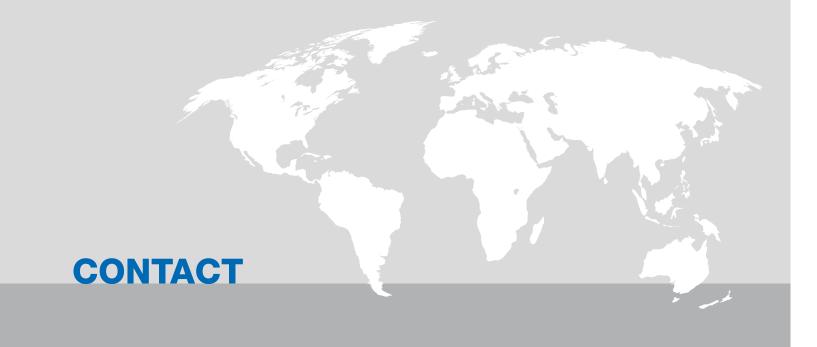
range. DELOLUX LED curing lamps are especially suitable as range from 400 to 550 nm can be used. per the chart below. All standard DELOLUX HID discharge lamps

Curing with UV light or visible light in the respective wavelength are also suitable. For preactivation, only visible light in a wavelength

	DELOLUX LED curing lamps							
Wavelength [nm]	365	400	460					
DELO DUALBOND AD761	++	+	-					
DELO DUALBOND GE731	++	+*	-					
DELO DUALBOND OB6769	++	-	-					
DELO DUALBOND OB6268	++	-	-					
DELO KATIOBOND DI6049	+***	+	++					
DELO KATIOBOND 4594	+ **	+	++					
DELO KATIOBOND 45952	+ **	+	++					
DELO KATIOBOND GE680	++	-	-					
DELO KATIOBOND OB678	++	-	-					

<sup>++</sup> especially suitable





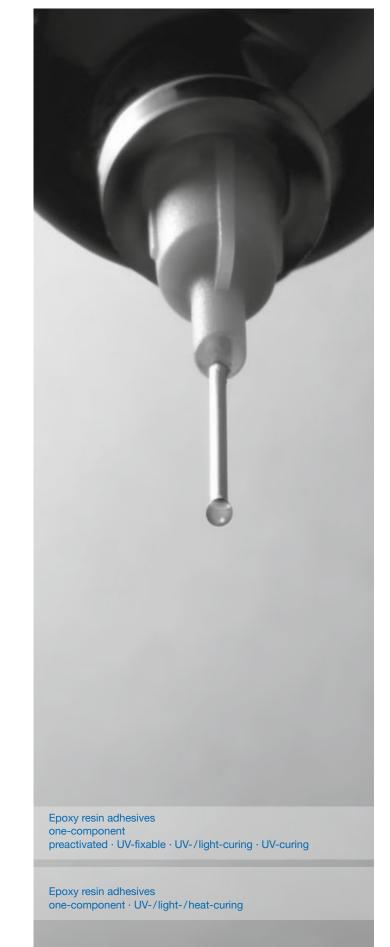
**DELO** Industrial Adhesives Headquarters



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- ➤ South Korea · Seoul
- ► Taiwan, China · Taipei
- ► Thailand · Bangkok
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SELECTION CHART

**DELO KATIOBOND DELO DUALBOND** 

<sup>+</sup> suitable

not suitable

<sup>\*</sup> not suitable for fast fixation, only in combination with heat curing \*\* suitable for direct irradiation, preactivation conditionally possible

<sup>\*\*\*</sup> fixation for thin layers

# Photoinitiated-curing epoxy adhesives

Product group/curing class  Product name		DELO DUALBOND			DELO KATIOBOND					
		UV-/light-/heat-curing			preactivated, UV-fixable preactivated, UV-/light-curing			UV-curing		
		AD761	GE731	ОВ6769	OB6268	DI6049	4594	45952	GE680	OB678
Color of cured product	in 0.1 mm layer thickness	yellowish transparent	yellowish transparent	whitish translucent fluorescent	yellowish transparent	whitish translucent	yellowish transparent	yellow transparent fluorescent	whitish translucent	colorless clear
Density [g/cm³]	DELO Standard 13 at room temperature (+23 °C)	1.14	1.09	1.65	1.43	1.81	1.13	1.15	1.8	1.13
Viscosity [mPa·s]	Anton Paar rheometer, shear rate 10 1/s at room temperature (+23 °C)	6,000	10,000	22,500	35,000	20,000	5,500	6,300	70,000	8,400
Curing/irradiation		UV or visible light  in the range 320 – 420 nm  or by heat  UV light  in the range 320 – 380 nm  or by heat		320 – 380 nm	UV or visible light in the range 320 – 550 nm			UV light  ✓ in the range 320 – 380 nm →		
Typical preactivation time [s] LED 460 nm, intensity 200 mW/cm², DELOLUXcontrol		-	-	-	-	10	3	8	-	-
Typical light fixation time [s] LED lamp, DELOLUXcontrol, see Technical Data Sheet for wavelength/intensity		15	30	1 – 3	15	5	-	-	-	-
Typical irradiation time [s] LED lamp, intensity: 200 mW/cm², DELOLUXcontrol		-	-	-	-	-	-	-	5	10
Curing time with heat without heating time of the components		5 min @ +130°C 3 min @ +150°C	10 min @ +130°C 5 min @ +150°C	50 min @ +80°C 20 min @ +100°C	15 min @ +130°C	15 min @ +60 °C (preactivated)	-	-	-	-
Max. curable layer thickness [mm]	DELO Standard 20	> 4	> 4	-	1.2	-	-	-	> 4	2.1
Max. layer thickness that can be activated [mm]	DELO Standard 21	-	-	-	-	4	> 4	> 4	-	-
Compression shear strength [MPa] DELO Standard 5 after 24 h at room temperature (approx. +23°C)	FR4/FR4	29 <sup>1)</sup>	n.d.	36 <sup>1)</sup>	n.d.	45 <sup>3)</sup>	20 <sup>3)</sup>	20 <sup>3)</sup>	16*2)	20*2)
	PBT/PBT	5 <sup>1)</sup>	n.d.	14 <sup>1)</sup>	14 <sup>1)</sup>	83)	93)	6 <sup>3)</sup>	11 *2)	9*2)
	AI/AI (laser)	37 <sup>1)</sup>	31)	36 <sup>1)</sup>	52 <sup>1)</sup>	48 <sup>3)</sup>	35 <sup>3)</sup>	27 <sup>3)</sup>	20*2)	20*2)
	PC/PC	40 <sup>1)</sup>	81)	41 <sup>1)</sup>	33 <sup>1)</sup>	83)	26 <sup>3)</sup>	143)	19**2)	47 **2)
Tensile strength [MPa]	by the criteria of DIN EN ISO 527 after 24 h at room temp. (approx. +23°C)	22 <sup>4)</sup>	1 <sup>4)</sup>	65 <sup>4)</sup>	46 <sup>4)</sup>	65 <sup>3)</sup>	27 <sup>2)</sup>	30 <sup>2)</sup>	37 <sup>2)</sup>	50 <sup>2)</sup>
Elongation at tear [%]	by the criteria of DIN EN ISO 527 after 24 h at room temp. (approx. +23°C)	864)	984)	0.84)	1 <sup>4)</sup>	0.63)	92)	85 <sup>2)</sup>	0.72)	3 <sup>2)</sup>
Young's modulus [MPa]	DMTA, 2nd run	1,000	< 10	11,000	6,300	17,000	2,300	1,100	16,800	3,400
Shore hardness	by the criteria of DIN EN ISO 868 after 24 h at room temp. (approx. +23 °C)	D 56	A 43	D > 90	D 88	D > 90	D 75	D 67	D > 90	D 85
Glass transition temperature T <sub>g</sub> [°C]	DMTA, 2nd run at room temperature (approx. +23°C)	+48	-33	+160	+202	+170	+140	+39	+160	+160
Coefficient of linear expansion [ppm/K] DELO Standard 26, TMA		91 (-40°C to -20°C)	-	26 (-40°C to +30°C)	37 (-40°C to +20°C)	18 (-40°C to -20°C)	123 (+30°C to +55°C)	-	33 (+30°C to +150°C)	65 (-40°C to +10°C)
		214 (+60°C to +140°C)	274 (-20°C to +150°C)	38 (+30 °C to +120 °C)	78 (+135°C to +170°C)	52 (+150°C to +170°C)	175 (+110°C to +170°C)	200 (+30°C to +145°C)	-	154 (+140°C to +170°C)
Shrinkage [vol. %]	DELO Standard 13 at room temperature (+23 °C)	3.3	2	1.7	0.7	2	4.3	3.7	1.7	3.9
Water absorption [weight %]	by the criteria of DIN EN ISO 62 after 24 h at room temp. (approx. +23 °C)	0.5	0.4	0.08	0.24	0.05	0.8	2.1	0.06	0.3

<sup>1)</sup> curing: heat

**Product description** 

DELO KATIOBOND and DELO DUALBOND are one-component, For optimal bond strength, the surfaces to be bonded must be free solvent-free adhesives based on epoxy resins.

initial strength takes place within seconds, depending on the type, poor establishment of adhesion. product groups cure until final strength even after irradiation is as sand blasting, flaming and plasma or corona treatment.

DELO DUALBOND products can be additionally cured by applying Storage life heat. This is advantageous wherever the adhesive cannot be After delivery, in the unopened original container: irradiated with light or cannot be irradiated sufficiently, e.g. in see Technical Data Sheet of the respective product. shadowed areas. The two curing mechanisms can be used independently.

# Usual temperature range

DELO KATIOBOND and DELO DUALBOND are normally used in a For application tests and any question you might have regarding temperature range of -40 °C to +150 °C. Individual products can be the use of DELO products, please do not hesitate to contact the used in a range up to +180°C.

Many product properties depend on the temperature and can Please also refer to the "Preactivated epoxy resin adhesives DELO suitable for the temperatures in the required area of application. 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

AD = ADhesive DI = Dual Initiator GE = General Encapsulant OB = Optical Bonding

Curing of the DELO KATIOBOND products is triggered by light in the appropriate wavelength range with sufficient intensity and irradiation time. Longer irradiation times, higher intensities or higher temperatures accelerate the curing process. Afterwards, the adhesive cures until final strength at room temperature without further irradiation.

With preactivated DELO KATIOBOND products, even opaque components can be bonded using light curing. The adhesives are typically activated through short irradiation times (preactivation time), enabling an open time within which the components should be joined. Afterwards, the adhesive cures until final strength at room temperature without further irradiation. You can find the exact values in the Technical Data Sheets.

In addition to light curing, DELO DUALBOND products can be cured by applying heat to the areas that are not accessible to light. Light and heat curing mechanisms can be used independently. This makes it possible to cure the DELO DUALBOND adhesive first in the accessible areas with light in a short time, and then perform a heat curing step to cure shadowed areas reliably, as well.

The above irradiation, preactivation and open times are based on tests according to DELO Standards with defined procedures, equipment and specimens. In practice, the time parameters may vary accordingly.

In the case of specified components to be joined, these can be influenced in particular by irradiation intensity and temperature. The curing time is reduced by higher temperatures and/or higher irradiation intensity. This also reduces preactivation and open

DELO KATIOBOND and DELO DUALBOND adhesives have a completely dry surface after curing. Therefore, they can be used very well for potting and coating applications.

### Surface pretreatment

of dust, oil, grease, separating agents and other contaminations. Curing of cationic DELO KATIOBOND and DELO DUALBOND until Strongly alkaline surfaces can inhibit adhesive curing, resulting in

by irradiation with UVA or visible light (VIS). The products of both Adhesion can be improved by suitable pretreatment methods, such

More type-specific properties are included in the Technical Data Sheets, Material Safety Data Sheets and Instructions for Use. DELO Engineering.

change permanently, in particular at high temperatures. Therefore, KATIOBOND" and "DELO PHOTOBOND" Selection Charts. These it has to be checked before each use whether a certain adhesive is are also photoinitiated, one-component and solvent-free adhesives. In contrast to the cationic-curing epoxies DELO KATIOBOND, Please see the Technical Data Sheet for more information on how DELO PHOTOBOND are based on radical-curing acrylate resins and can be cured very quickly until final strength by irradiation with UVA light or visible light (VIS).

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

<sup>3)</sup> curing: preactivation

<sup>4)</sup> curing: combination of light and heat

<sup>\*</sup> mixed bonding with glass \*\* bonding with PC Lexan

n.d. = not determined