



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

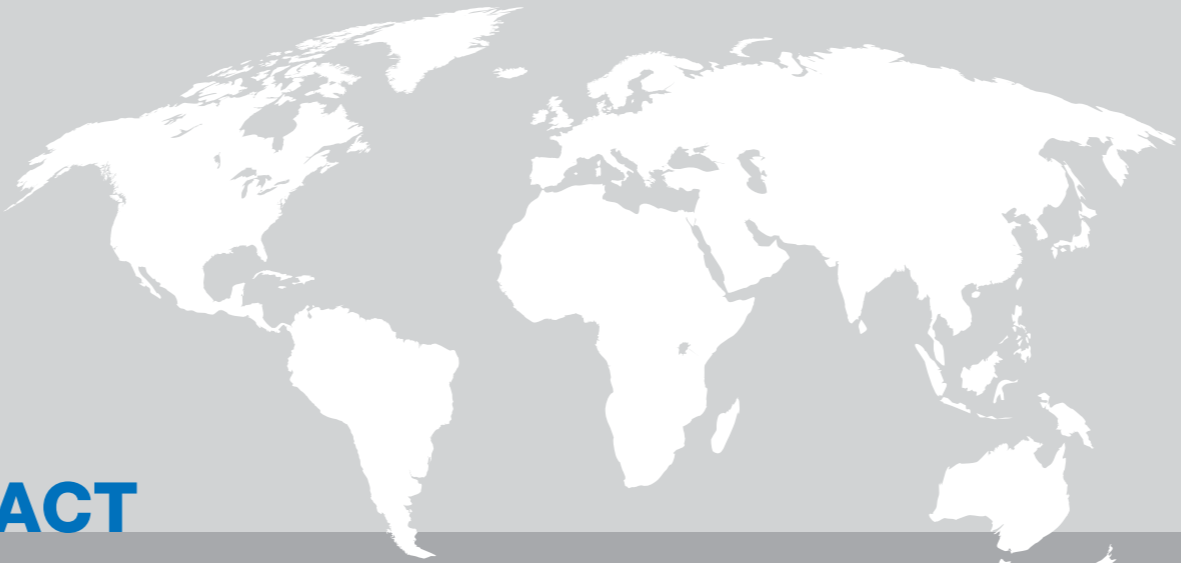
Epoxy resins
one-component · UV-/light-/heat-curing

SELECTION CHART

DELO-KATIOBOND

DELO-DUALBOND

CONTACT



Headquarters

DELO Industrial Adhesives
► **Germany** · Windach / Munich
Phone +49 8193 9900-0
info@DELO.de
www.DELO.de

DELO Industrial Adhesives
► **China** · Shanghai
Phone +86 21 2898 6563
info@DELO.cn
www.DELO.cn

DELO Industrial Adhesives
► **South Korea** · Seoul
Phone +82 2 2190 3727
info@DELO.de
www.DELO.de/en

DELO Industrial Adhesives
► **USA** · Sudbury / Boston, MA
Phone +1 978 254 5275
info@DELO.us
www.DELO.us

DELO Industrial Adhesives
► **Singapore**
Phone +65 6560 0236
info@DELO.com.sg
www.DELO.com.sg

DELO Industrial Adhesives
► **Malaysia** · Kuala Lumpur
Phone +65 6560 0236
info@DELO.de
www.DELO.de/en

DELO Industrial Adhesives
► **Taiwan** · Taipei
Phone +886 2 6639 8248
info@DELO.com.tw
www.DELO.com.tw

Adhesives

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Further information

You can find more details on type-specific properties in the technical data sheets and material safety data sheets.

Our Engineering Department will be pleased to support you in technical application tests and questions resulting from processing DELO products.

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 cured by UVA or visible light (VIS).

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.

Storage life

Most DELO-KATIOBOND and DELO-DUALBOND products are durable for ≥ 6 months if stored in unopened original container at room temperature.

Some products must be stored at temperatures of 0°C to +10°C. You can find detailed information in the technical data sheet.

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.

Lamp type	DELOLUX 80, DELOLUX 50, DELOLUX 20		
	365	400	460
DELO-DUALBOND AD761	++	+	-
DELO-KATIOBOND 4552	+ ⁷⁾	+	++
DELO-KATIOBOND KB554	+ ⁷⁾	+	++
DELO-KATIOBOND 4557	+ ⁷⁾	+	++
DELO-KATIOBOND 4578	+ ⁷⁾	+	++
DELO-KATIOBOND 4591	+ ⁷⁾	+	++
DELO-KATIOBOND 4594	+ ⁷⁾	+	++
DELO-KATIOBOND 45952	+ ⁷⁾	+	++
DELO-KATIOBOND 4597	+ ⁷⁾	+	++
DELO-KATIOBOND AD640	++	+	-
DELO-KATIOBOND OB642	++	+	-
DELO-KATIOBOND OB678	++	-	-
DELO-DUALBOND OB749	++	+	-

++ especially suitable - not suitable
+ suitable ⁷⁾ suitable only for direct irradiation, preactivation not possible

Product selection

Application area	Casting and coating	Bonding of UVA- and VIS-permeable materials	Bonding of VIS-permeable materials	Bonding of opaque materials	Bonding, casting and coating with reliable curing in shadowed areas
Products	All DELO-KATIOBOND and DELO-PHOTOBOND products	All DELO-KATIOBOND and DELO-PHOTOBOND products	Light-activated DELO-KATIOBOND and light-curing DELO-PHOTOBOND products	Light-activated DELO-KATIOBOND products	DELO-DUALBOND products
Processing suggestion	Application ↓ Irradiation	Application ↓ Joining ↓ Irradiation	Application ↓ Preactivation ↓ Joining	Application ↓ Preactivation ↓ Joining	Application ↓ Joining ↓ Irradiation and/or heating

Our selection charts 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 user's responsibility to test the suitability of the product for the intended purpose by considering all specific requirements. 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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07/15

Photoinitiated-curing adhesives

Product group/curing class

Product code	DELO-DUALBOND		DELO-KATIOBOND								DELO-KATIOBOND		DELO-KATIOBOND				
	UV-/light-/heat-curing		light-activated, UV-/light-curing								UV-/light-curing		UV-curing				
Application area (B = bonding, S = sealing, C = coating)	AD761	OB749	4552	KB554	4557	4578	4591	4594	45952	4597	AD640	OB642	4670	DF698	OB678		
Color cured product	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	B/S/C	S/C	S/C	B/S/C		
Density [g/cm³] at room temperature (+23 °C)	1.1	1.48	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.4	1.4	1.1		
Viscosity [mPas] (+23 °C) Brookfield	11,000 thix	13,000	1,200	1,500	3,500	12,400 thix	23,000 thix	32,000 thix	32,000 thix	48,000 thix	9,000 thix	9,500	4,800	180,000 thix	60,000		
Curing/irradiation	UV- and light-curing from 320 to 420 nm or with heat	can be cured with light in a wavelength range from 320 to 440 nm or with heat	← can be activated with visible light in a wavelength range from 400 to 550 nm →								UV- and light-curing from 320 to 440 nm		UV-curing from 320 to 380 nm				
Preactivation time [s] UVA intensity ³⁾ approx. 55 – 60 mW/cm²	DELO Standard 19	–	–	3	2	5	2	6	4	5	6	–	–	–	–	–	
Open time after preactivation [s] +23 °C + normal room lighting	DELO Standard 19	–	–	20	27	17	18	17	13	18	16	–	–	–	–	–	
Minimum irradiation time [s] DSC: UVA intensity ³⁾ 55 – 60 mW/cm², +30 °C	DELO Standard 37	10	9	15	24	24	15	15	14	22	24	9	6	9	17	5	
Recommended irradiation time [s] DELOLUX 03 S: UVA intensity ³⁾ 55 – 60 mW/cm²		30	15	60	60	60	60	60	60	60	15	10	60	60	6	6	
Curing time with heat [min] without heating time of the components, at +130 °C		5	15	–	–	–	–	–	–	–	–	–	–	–	–	–	
Curing time until final strength [h]		← 24 →															
Compression shear strength [MPa] DELO Standard 5 Irradiation and curing conditions: DELOLUX 03 S UVA intensity ³⁾ 55 – 60 mW/cm² for adhesive-specific irradiation time see TDS curing time 24 h at room temperature (approx. +23 °C)	glass/glass	25	25	24	31	10	27	20	25	30	10	22	23	35	28	15	
	glass/Al	18	16	17	22	9	20	15	20	13	10	16	16	10	12	11	
	glass/FR4	24	16	27	21	14	20	19	18	19	11	20	12	35	23	12	
	PC/Al	6	–	6	6	7	4	8	6	4	5	4	3	– ¹⁾	– ¹⁾	–	
	PC/PC	10	8	30	10	18	30	13	28	14	19	6	9	– ¹⁾	– ¹⁾	12	
	PMMA/PMMA	8	9	10	5	8	10	6	10	9	11	10	10	– ¹⁾	– ¹⁾	6	
	PBT/PBT (with preactivation)	6 ⁴⁾	–	6	6	9	8	7	9	9	8	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	
	PETP/PETP (with preactivation)	4 ⁴⁾	–	8	7	10	7	6	6	8	9	–	– ¹⁾	– ¹⁾	– ¹⁾	– ¹⁾	
Tensile strength [MPa]	DIN EN ISO 527	23 ⁵⁾	41 ⁵⁾	24	16	6	21	8	31	18	4	45	46	30	22	37	
Elongation at tear [%]	DIN EN ISO 527	84 ⁵⁾	0.9 ⁵⁾	3	45	10	3	50	4	54	7	3	2	6	20	2	
Young's modulus [MPa]	DIN EN ISO 527	113 ⁵⁾	5,200 ⁵⁾	1,100	100	100	900	– ²⁾	1,200	– ²⁾	– ²⁾	2,000	2000	1,700	160	1,700	
Shore hardness D	according to DIN EN ISO 868	58 ⁵⁾	81 ⁵⁾	58	51	29	65	26	69	44	40	65	81	79	61	80	
Glass transition temperature [°C]	rheometer	42 ⁵⁾	145 ⁵⁾	130	37	50	132	30	158	44	55	100	136	62	35	118	
Average coefficient of linear expansion [ppm/K]	TMA, in temperature range: +30 °C to +150 °C	216 ⁵⁾	113 ⁵⁾	158	200	185	154	202	156	196	180	135	166	150	147	122	
Shrinkage [vol. %]	DELO Standard 13	3.0 ⁵⁾	2.2 ⁵⁾	3.7	3.8	2.5	4.1	2.7	3.9	3.8	2.9	3.7	4	3	2.9	4	
Water absorption [weight %]	according to DIN EN ISO 62 24 h at approx. +23 °C	0.3 ⁵⁾	0.1 ⁵⁾	1.5	1.0	1.2	0.9	0.8	1.0	0.9	1.1	0.3	0.7	0.19	0.4	0.3	
Specific volume resistance [Ωcm]	VDE 0303, part 3	> 1 x 10 ¹³ ⁵⁾	n.d.	> 1 x 10 ¹³	> 1 x 10 ¹³	> 1 x 10 ¹⁰	> 1 x 10 ¹³	> 1 x 10 ¹¹	> 1 x 10 ¹³	> 1 x 10 ¹³	> 1 x 10 ¹⁰	> 1 x 10 ¹³	n.d.	> 1 x 10 ¹³	> 1 x 10 ¹³	n.d.	
Surface resistance [Ω]	VDE 0303, part 3	> 1 x 10 ¹³ ⁵⁾	n.d.	> 1 x 10 ¹³	> 1 x 10 ¹³	> 1 x 10 ¹⁰	> 1 x 10 ¹³	> 1 x 10 ¹³	> 1 x 10 ¹³	> 1 x 10 ¹³	> 1 x 10 ¹²	> 1 x 10 ¹⁰	> 1 x 10 ¹³	n.d.	> 1 x 10 ¹³	> 1 x 10 ¹²	n.d.
Dielectric constant	1 MHz	3.5 ⁵⁾	n.d.	3.9	4.0	4.8	4.0	3.9	3.9	4.3	4.9	3.7	n.d.	3.3	3.6	n.d.	
	RF-IV method, at +25 °C +/- 3 °C	3.0 ⁵⁾	n.d.	3.2	3.2	3.5	3.3	3.3	3.2	3.2	3.6	2.9	n.d.	3.0	3.3	n.d.	
Special features of product	in shadowed areas the product can be cured by heat light and heat curing mechanism can be used independently	fast build-up of adhesion low-temperature-curing in shadowed areas, the product can be heat-cured fast fixing time of 1 – 5 sec	good flow behavior hard composite fast curing	good flow behavior tough-elastic tension-equalizing fast curing	good flow behavior tough-hard	medium-viscous hard composite fast curing	medium-viscous tough-elastic tension-equalizing	fills gaps hard composite fast curing	fills gaps tough-elastic tension-equalizing	fills gaps tough-hard	medium-viscous very fast build-up of adhesion very good chemical resistance low water absorption low ion content very low outgassing	fast build-up of adhesion high TG high optical transparency and yellowing resistance	good flow behavior low water absorption very low ion content chip encapsulation compound	very steady low water absorption very low ion content Dam for chip encapsulation compounds	fast build-up of adhesion good adhesion and humidity resistance on stainless steel		

¹⁾ No component permeable to UVA light
²⁾ Young's modulus not measurable
³⁾ Intensity meter: DELOLUXcontrol
⁴⁾ Measuring values with heat curing
⁵⁾ Measuring values with combined light and heat curing
n. d. = not determined

AD = **AD**hesive **DF** = **D**am & **F**ill **KB** = **K**ATIOBOND **OB** = **O**ptical **B**onding

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 permanently change, especially at high temperatures. Therefore, the suitability of the respective adhesive for the intended temperature range of use must be tested according to the application before use. You can find details on the behavior of the products under the influence of elevated temperatures in the respective technical data sheet.

Processing

The products are usually supplied ready for use and can be processed well from the original container or with dispensing units. You can find more details in the DELO equipment brochure.

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 and DELO-KATIOBOND AD640 and OB642 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 +120 °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.

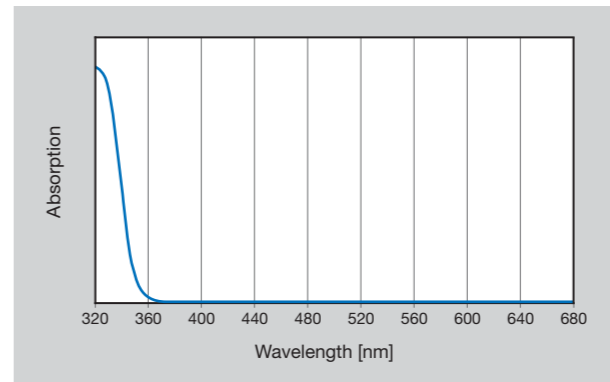
The curing, preactivation and open times mentioned are based on tests according to DELO Standards with defined techniques, equipment and specimens. The irradiation times can deviate accordingly in practice. They can be particularly influenced by irradiation intensity and temperature when using certain 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.

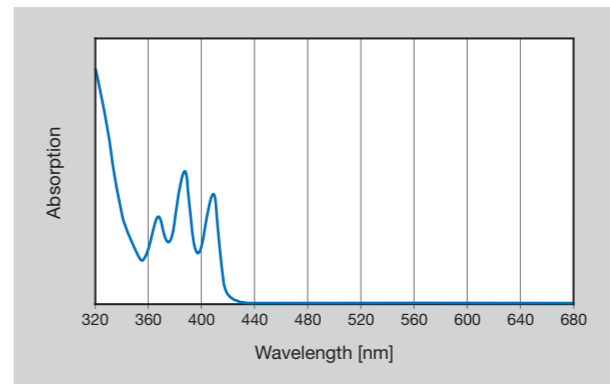
Surface pretreatment

For optimal adhesion, the surfaces to be bonded must be free of oil, grease, separating agents and other contaminations. Highly alkaline surfaces can inhibit adhesive curing – resulting in an only moderate build-up of adhesion.

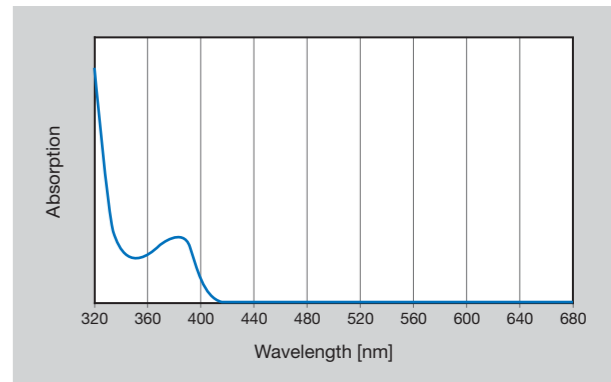
Adhesion can be improved by suitable pretreatment methods, such as sand blasting, flaming and plasma or corona treatment. For the cleaning of glass DELOTHEN EP cleaner has proven to be efficient.



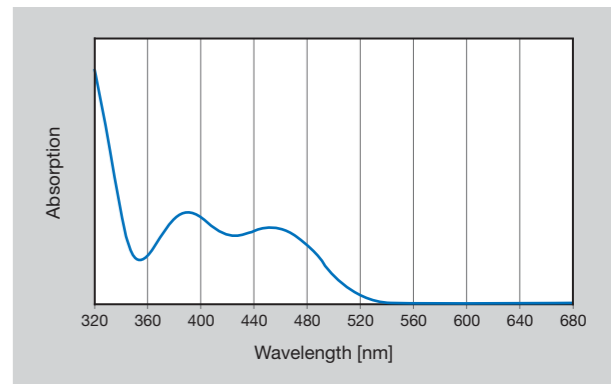
Absorption spectrum of the photoinitiator of DELO-KATIOBOND 4670 and DELO-KATIOBOND DF698 in an epoxy resin basic matrix. The absorption spectrum of DELO-KATIOBOND AD610 is very similar to the illustrated spectrum as regards quality and is not shown explicitly.



Absorption spectrum of the photoinitiator of DELO-KATIOBOND AD640 in an epoxy resin basic matrix.



Absorption spectrum of the photoinitiator of DELO-DUALBOND AD761 in an epoxy resin basic matrix.



Absorption spectrum of the photoinitiator of the light-activated DELO-KATIOBOND adhesives in an epoxy resin basic matrix.