

Instructions for Use & General Information on the Product Group

DELO® KATIOBOND®

Light-activated, UV-/light-curing
and UV-curing epoxy resins



Application areas

DELO® KATIOBOND® adhesives are predominantly used in semiconductor packaging, microelectronics, electrical engineering, optoelectronics, organic electronics, automotive and hard disk drives for bonding, coating, fixing, casting and sealing.

They are characterized by the possibility of preactivation, low outgassing, dry surface, high reliability, chemical and temperature resistance.

The suitability and strength of the adhesive must be verified on original components under the application-specific conditions.

Preparation of the components to be bonded

For optimal bond strength, the surfaces to be bonded must be free of dust, oil, grease, separating agents and other contaminations. Our DELOTHEN cleaners are available for this purpose. The Technical Information “Cleaners” provides more details.

When using aqueous cleaners with alkaline properties, they must be removed from the bonding surface in adequate rinsing cycles after cleaning

When using alkaline cleaners, a neutralization of the surface must be ensured. Alkaline surfaces can inhibit adhesive curing, resulting in poor or even no establishment of adhesion at all. In addition to wet-chemical cleaning, adhesion can be further improved by a suitable chemical and physical surface pretreatment. For more details, please refer to the Technical Information "Surface Pretreatment".

It is advantageous to preheat the two components to reduce condensation or surface humidity. Furthermore, a warm surface can improve establishment of adhesion to the surface, and therefore reduce the time until functional strength is achieved.

Preparation of the adhesive

The products are usually supplied ready for use.

In case of cool or refrigerated storage, the containers must be conditioned to room temperature before use to prevent condensation during adhesive application. Heat addition is not permitted. The conditioning time depends on the container size and the storage temperature.

DELO® KATIOBOND® adhesives, which are prone to sedimentation (see Technical Data Sheet) must be homogenized in the container before use.

You can find details about preparation of the products in the specific Technical Data Sheet.

Processing

After conditioning to room temperature and if necessary homogenization, the products can be directly applied from the container or with a dispensing system.

We recommend using dispensing valves and product-bearing elements made of inert and totally opaque material. Suitable materials include PE, HDPE, PP, PTFE and stainless steel. Other materials require compatibility assessment. We do not recommend using polyurethanes, polyamides, copper and its alloys.

All parts in contact with the product must be cleaned thoroughly with e.g. isopropanol or acetone before use. Please refer to the Technical Info "Cleaners" for suitable cleaners for removing DELO® KATIOBOND® residues.

We recommend dispensing from the original container. When exchanging the container, the adhesive must not be exposed to scattered light as this triggers polymerization. If adhesive must be refilled due to system-related circumstances, it must be ensured that the adhesive does not get contaminated by foreign substances or humidity.

In addition, the adhesive must be completely protected against light in the specific spectrum used for curing. It is recommended that the adhesive be refilled under dark room conditions or to use appropriate filter foils to keep out the light of relevant wavelength.

DELO® KATIOBOND® adhesives are intended to be used at temperatures between +64.4 and +77°F (+18 and +25°C) and a relative air humidity between 20 to 65% (normal room climate). So far, we have not had any negative experience as to processing under these room temperature and air humidity conditions. The products could be processed very well under laboratory conditions, and no impairment of the processing properties could be recognized.

You can draw detailed information about how to handle the products from the specific Technical Data Sheet.

Curing of the adhesive layer

Curing is initiated by exposure to light in the suitable wavelength range with sufficient intensity for a sufficient period of time. Afterwards, the adhesive cures until final strength at room temperature without further irradiation.

The light intensity is one parameter important for curing. As the intensity decreases over the lifetime of the light source or can be impaired by other factors (e.g. contamination of the lamp), the intensity must be checked at regular intervals and readjusted when necessary.

Curing of the adhesive layer is also influenced by environmental conditions, such as temperature and humidity. When designing bonding processes, seasonal fluctuations of the room climate must be considered and should be evaluated in the qualification phase, particularly when bonding humidity-absorbing component (e.g. polyamide).

Post-crosslinking can normally be achieved through subsequent heat input. This changes the physical parameters, and can have a positive effect on the achievable strength and reliability of bonds. The same effect can also be achieved by preheating the components or heat addition during curing.

Depending on the application, the user can choose from two handling sequences for DELO® KATIOBOND® products:

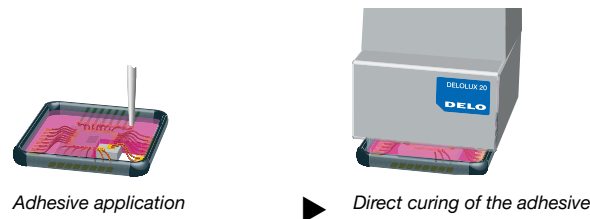
- Direct irradiation of the adhesive until initial strength
- Preactivation of the adhesive followed by joining

Direct irradiation of the adhesive until initial strength

The adhesive is directly irradiated in case of open bonding, coating, sealing, casting, or when bonding and sealing transparent components. Curing can only be completed if the entire adhesive volume is reached by light of the corresponding wavelength with sufficient intensity.

Open bonding, coating or sealing

1. Preparation of the adhesive and the components
2. Adhesive application
3. Curing with the appropriate light spectrum



When curing open bonds, it must be kept in mind that the light intensity decreases with increasing penetration depth. The maximum curable layer thickness depends on the adhesive and is a function of the light spectrum (wavelength) and the light intensity. Reference values for the maximum curable layer thickness can be found in the Technical Data Sheet.

Bonding or sealing of transparent components

1. Preparation of the adhesive and the components
2. Adhesive application
3. Joining
4. Direct curing through the transparent component with the appropriate light spectrum



Due to the adhesive-specific curing wavelength, the transmission of the components in the required wavelength range must be checked before bonding optically transparent materials (e.g. plastic). When irradiating the adhesive through a transparent component, the intensity that the light source reaches behind the component must be determined.

Preactivation of the adhesive followed by joining

In principle, all DELO® KATIOBOND® products can be preactivated by exposure to light. However, only specifically optimized products provide sufficiently long open times in practice. The open time is the period of time between the end of irradiation and the formation of skin on the adhesive surface. Details on the suitability for light activation are provided by the specific Technical Data Sheet.



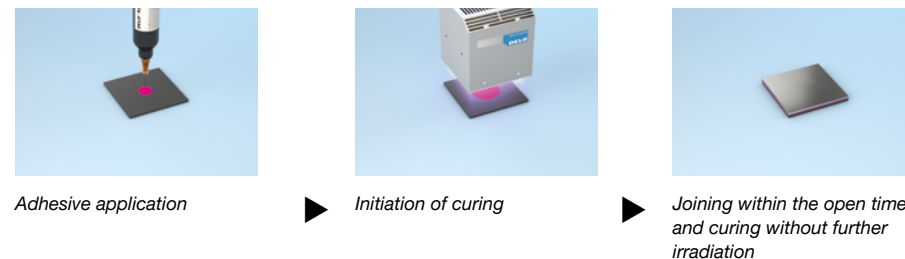
The preactivation time is a reference value for a practicable open time (usually 20 s). After irradiation, the adhesive remains liquid for a certain period of time. The components must be joined within the open time. The preactivation time and the open time vary in dependence of substrate, irradiation parameters and adhesive layer geometry, and must be individually determined on original components under production conditions for every application.

After sufficient preactivation, the adhesive completely cures within 24 h to 7 d at room temperature without further irradiation. Details about the curing time of a product can be found in the specific Technical Data Sheet. Complete curing can only be achieved if the entire adhesive volume has been reached by light of the suitable wavelength at a sufficiently high intensity. The light intensity decreases with increasing penetration depth. The maximum activatable layer thickness depends on the adhesive and is a function of the light spectrum (wavelength) and the light intensity. We recommend preactivation for fully automated processes only. Functional strength of light-activated products is usually achieved within a few minutes (1–10 minutes).

During this period of time, the bonding must remain fixed. Heat addition accelerates this process, heat dissipation (e.g. by metal components) decelerates it. Extensive details about preactivation can be found in the Technical Information “Preactivation”.

Bonding of opaque components by preactivation

1. Preparation of the adhesive and the components
2. Adhesive application
3. Initiation of curing (preactivation) with the appropriate light spectrum
4. Joining of the components within the open time



Details about curing

The irradiation parameters must be individually determined on original components under production conditions for every application. The curing reaction of the DELO® KATIOBOND® adhesives is significantly influenced by irradiation parameters, adhesive quantity and temperature. In order to obtain reproducible process results, these parameters must be kept consistent in production. The values for the irradiation parameters specified in the Technical Data Sheet are determined according to DELO® Standards with specified methods, devices and specimens. Therefore, they are only reference values.

Heat is required for a satisfactory progress of the reaction. This can be provided by the light source, the exothermic reaction of the adhesive itself, or a separate heat source. High temperatures during or after curing can lead to post-crosslinking of the adhesive which influences the physical properties of the bond.

Polymerization of the adhesive is an exothermic reaction. When using large adhesive quantities, the heat released during this reaction may damage the component or the adhesive.

Instructions and advice for occupational health and safety

The instructions in the Material Safety Data Sheet of the specific product and the hazard symbols on the labels of the adhesive containers must be observed.

Skin and eyes must be protected against UV light, glare of the lamp, possible reflections and scattered light. Complete shielding of the emissions by suitable optical filters is recommended. If the light source is not completely shielded, suitable clothing for eye and skin protection must be worn. Please contact your safety officer for further details.

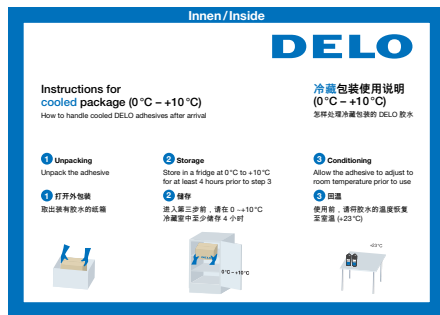
Sufficient ventilation during processing must be ensured.

Storage

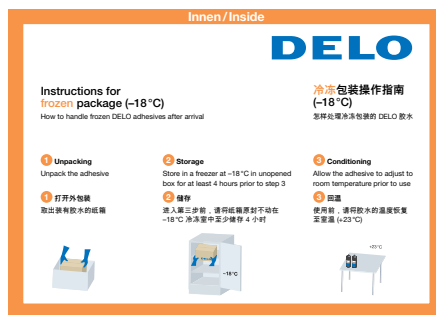
Removal of the containers

After delivery, the package must be removed from the dry ice and conditioned to the storage temperature in unopened condition for at least 4 h.

Please make sure that the frozen container is only minimally touched as large temperature difference between container and adhesive may lead to the adhesive becoming “detached” from the inner cartridge wall. It is recommended that the container is removed at its end or thermally insulating gloves are used (see pictures).



Handling of cooled package +32 °F to +50 °F (0 °C to +10 °C) storage



Handling of frozen package -0.4 °F (-18 °C) storage

Storage of the containers

Inappropriate storage must be avoided as this may change the adhesive properties to an unpredictable extent.

Depending on the product, the adhesive must be stored in the unopened original container in a cold (+32 to +77°F/0 to +25°C) or frozen (-13°C to -5°C/-25°C to -15°C) and dry place. Do not expose the container to direct sunlight as this may cause it to heat up considerably. This may lead to an unintended decrease in reactivity or even curing of the adhesive.

For information on storage life and the recommended storage conditions of the respective adhesive, please refer to the Technical Data Sheet or the container label.

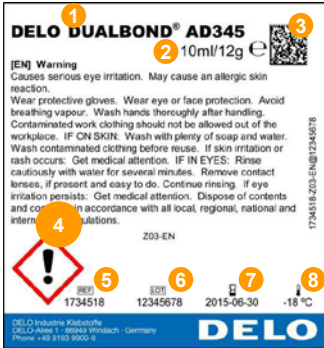
Trouble-shooting

Best bonding results require the maintenance of optimized processing parameters. In case of deviations in curing conditions the results achieved may differ. The following chart gives an overview of errors which may occur when using these products and it provides information on possible causes and remedies. If you have any other questions about how to use our products, please feel free to directly contact our application experts.

Error pattern	Error	Possible cause	Remedies
Insufficient adhesion	Changed component surface	Inhibition of the adhesive due to alkaline component surface	Neutralize or dry the component surface
		Curing temperature on the component surface too low	Preheat the component to be bonded
Changed wetting behavior	Changed viscosity	Adhesive too cold or too warm	Conditioning of the adhesive
		Possible sedimentation of the filler (see Technical Data Sheet)	Tumble the container or homogenize the adhesive by a stirring element in the tank
		Storage life of the adhesive exceeded	Use the products within their storage life
Insufficient curing	Too low irradiation intensity	Changed surface properties (e. g. due to dissimilar material batches, suppliers, etc.)	Adapt the dispensing parameters; restore the original condition of the components
		Lamp aging	Readjust the lamp intensity or exchange the light source
Insufficient curing	Too short irradiation time	Contaminated beam path	Clean the beam path
		Decrease in reactivity of the adhesive	Use the products within their storage life
	Decrease in reactivity of the adhesive	Storage life of the adhesive exceeded	Use the products within their storage life

Label

Typical design of a GHS label at DELO. Depending on the container size, the design and content of the label may vary.



- 1 Product name
- 2 Container content (volume/weight)
- 3 Datamatrix
Extended article number@Batch@Expiry date@Product name
(1734518-Z03-EN@12345678@2015-06-30@DELO DUALBOND AD345)
- 4 GHS labeling
- 5 Article number
- 6 Batch number
- 7 Expiry date
- 8 Storage temperature

CONTACT

DELO Industrial Adhesives
Headquarters

► **Germany** · Windach / Munich

- **China** · Shanghai
- **Japan** · Yokohama
- **Malaysia** · Kuala Lumpur
- **Singapore**
- **South Korea** · Seoul
- **Taiwan** · Taipei
- **Thailand** · Bangkok
- **USA** · Sudbury, MA

..... www.DELO-adhesives.com



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.

© DELO® – This document including any and all parts is protected by copyright. Any use not expressly permitted by the Urheberrechtsgesetz (German Copyright Act) shall require DELO®'s written consent. This shall apply without limitation to reproductions, duplications, disseminations, adaptations, translations and microfilms as well as to the recording, processing, duplication and/or dissemination by electronic means.
02/13