

DELO

Instructions for Use & General Information on the Product Group

DELO DUALBOND® cationic

UV- /light-curing and
heat-curing epoxy resins



Application areas

DELO DUALBOND products with cationic polymerization are predominantly used in semiconductor packaging, microelectronics, electrical engineering, optoelectronics, organic electronics, automotive, and hard disk drives for bonding, sealing, coating, fixing and casting.

They are characterized by dual curing (light/heat), low outgassing, dry surface, high reliability and resistance to temperatures and media.

Preparation of the components to be bonded

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

When using alkaline cleaners, a neutralization of the cleaned 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 for reducing condensation or surface humidity. Furthermore, a warm surface can improve the 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 storage, the containers must be conditioned to room temperature before use to prevent condensation during adhesive application. Heat addition during conditioning is not permitted. The conditioning time depends on the container size and the storage temperature.

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

The adhesive must not be frozen and thawed again.

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 DUALBOND residues.

We recommend dispensing from the original container. 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 is refilled under dark room conditions or keep out light by using appropriate filter foils.

DELO DUALBOND adhesives are intended to be used at temperatures between +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

The adhesive can be cured by heat addition, by light, or by a combination of light and heat. Complete curing by light can only proceed if the total adhesive is reached by light of the suitable wavelength, and if it is irradiated with the suitable intensity and for the necessary period of time. Please refer to the specific details about curing parameters in the Technical Data Sheet. Both light curing mechanism and heat curing mechanism are based on cationic polymerization and can be used independently. Pure light curing, pure heat curing and the combination of light and heat curing may result in deviating properties. The values specified in the Technical Data Sheet are mostly based on combined curing.

Complete curing by light can only be achieved if the complete adhesive volume is reached by light of the suitable wavelength with the suitable intensity. The intensity is a key parameter for curing. As the intensity decreases over the lifetime of the light source or is impaired by other factors (e.g. contamination), the intensity must be checked at regular intervals and readjusted if necessary.

Areas not accessible to light (e.g. shadowed areas, thick layers) can be cured in a subsequent heat curing step. The heating time of the components must be added to the curing time. It is important that the curing temperature is reached by the entire adhesive layer.

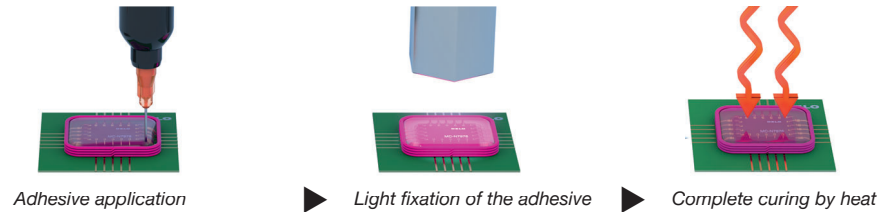
In case of curing temperatures below the temperature ranges specified in the Technical Data Sheet, curing is decelerated or the product cures incompletely or not at all. Therefore, we advise against using temperatures below those specified in the Technical Data Sheet.

In principle, we recommend that heat curing is performed soon after adhesive irradiation. For reasons of process reliability, the period of time between heat curing and irradiation should be kept as short as possible to exclude or minimize unforeseeable or negative influences on the bonding. In order to obtain reproducible values for the bonded connection, we recommend that the curing sequence and conditions are kept stable for all components.

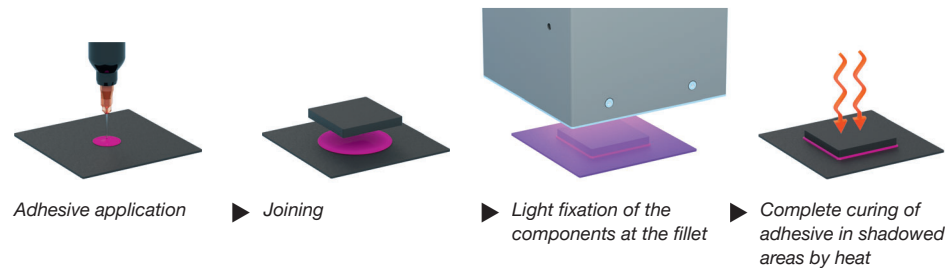
When designing bonding processes, seasonal fluctuations of the room climate must be considered and should be evaluated in the qualification phase, particularly when bonding humidity-absorbing components (e.g. polyamide).

Open bonding, coating, sealing or casting

1. Preparation of the adhesive and the components
2. Adhesive application
3. Light fixation of the adhesive
4. Complete curing by heat



An open adhesive layer can be fixed by exposure to light, for example to prevent flowing of the adhesive during later heat curing. This method is particularly suitable for deep, not completely permeable casting applications. When curing open bonds by light, it must be kept in mind that the light intensity decreases with increasing penetration depth. The maximum light-curable layer thickness depends on the adhesive and is a function of the light spectrum (wavelength) and the light intensity. Guide values for the max. curable layer thickness can be found in the specific Technical Data Sheet. Shadowed or deeper areas must be cured in a subsequent heat curing step.

Bonding of components including light fixation step

Production process when bonding components using light fixation:

1. Preparation of the adhesive and the components
2. Adhesive application
3. Joining of the components
4. Light fixation of the components with the suitable light spectrum at the fillet
5. Complete curing of adhesive in shadowed areas by heat

Light fixation of adhesive subareas, for example the fillet, can cause initial strength of the joined connection, so transport to the next step of heat curing is possible without any component fixation. Final curing is performed in a subsequent heat curing step.

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 DUALBOND adhesives is significantly influenced by irradiation parameters, adhesive quantity, temperature and duration of the heat curing step. In order to obtain reproducible process results, these parameters must be kept consistent in production. The values for the curing parameters specified in the Technical Data Sheet are determined according to DELO Standards with specified methods, devices and specimens.

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.

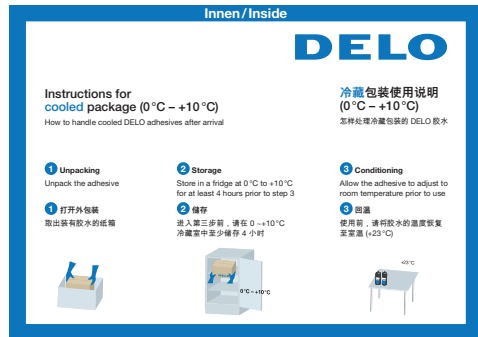
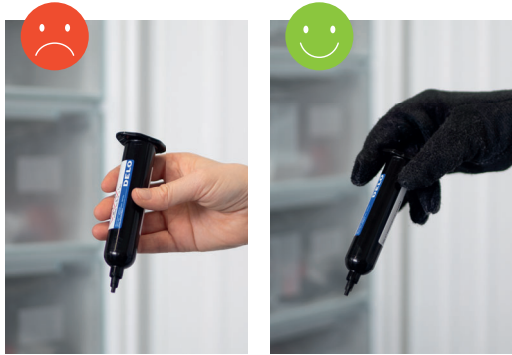
Sufficient ventilation during processing must be ensured.

Storage

Removal of the containers

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

Please make sure that the frozen container is only minimally touched as a 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 0 °C to +10 °C storage



Handling of frozen package -18 °C storage

Storage of the containers

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

The adhesive must be stored in the unopened original container in a cold (< +10 °C) or frozen (< -18 °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
	Contamination	Contamination by oils, greases, silicones, dust, etc.	Remove the cause of contamination, clean the surface
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	
Changed component surface	Changed surface properties (e. g. due to dissimilar material batches, suppliers, etc.)	Adapt the dispensing parameters; restore the original condition of the components	
Incomplete curing	Temperature input during heat curing too low	Too low curing temperature	Adjust the curing temperature
		Too short curing time	Adjust the curing time
	Decrease in reactivity of the adhesive	Storage life of the adhesive exceeded	Readjust the irradiation time
Changed component surface	Inhibition of the adhesive due to alkaline component surface	Use the products within their storage life	
	Changed component surface	Inhibition of the adhesive due to alkaline component surface	Neutralize or dry the component surface

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
(1926818-Z01-EN@12345678@2021-01-30@DELO PRODUCT NAME)
- 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, China** · 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.

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