

DELO

Instructions for use &
general information on
the products

DELOMONOPOX IC

One-component isotropic conductive adhesives
for the electrical contacting of solar cells



1 Application areas

The DELOMONOPOX IC adhesives described hereinafter are predominantly used for the electrical contacting of thin-film solar cells.

2 Storage conditions during transport

It is recommended that DELOMONOPOX IC adhesives are transported at temperatures of $\leq -18^{\circ}\text{C}$. This ensures that the products provide the full processing time at room temperature specified in the Technical Data Sheet.

In case of transport in dry ice, the transport time is restricted to three days as dry ice ensures cooling for this period only. Renewing of the dry ice during transport can prolong the transport time accordingly.

3 Storage conditions at the user's site

The storage temperature is $\leq -18^{\circ}\text{C}$. You can draw the storage life after delivery in the unopened original container of the DELOMONOPOX IC adhesives from the specific technical data sheet.

In order to prevent the formation of bubbles in the cartridges during storage, temperature fluctuations of more than 5°C should be avoided.

When cooling the cartridges at temperatures below -30°C , bubbles may be formed in the cartridge.

4 Preparation for use

When storing DELOMONOPOX IC adhesives at a refrigerated place, they must be conditioned to room temperature (max. $+25^{\circ}\text{C}$) before use. Heat addition is not permissible. The conditioning times are listed in the following chart.

Product	Conditioning time from storage temperature (-18°C) to room temperature ($+23^{\circ}\text{C}$)	
	Temperature for containers up to 10 ml	Temperature for containers up to 30 ml
DELOMONOPOX IC VE 19463	0.5 h	1.25 h
DELOMONOPOX IC VE 58573		
DELOMONOPOX IC VE 58749		

4.1 Preparation of the components

The contact surfaces must be free of oil, grease and other contaminations in order to achieve optimal bond strength. We provide our DELOTHEN cleaners. You can find more details in the "DELOTHEN Cleaners" technical information.

5 Processing

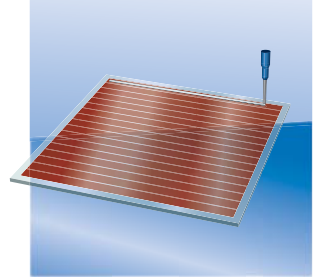
For bubble-free dispensing, the adhesive should preferably be dispensed from the original container. Basically, dispensing with screw dispensers or in combination with appropriate dispensing valves is possible but should be tested for the specific application task in advance.

5.1 Dispensing, contacting and curing

The adhesives are normally applied by dispensing.

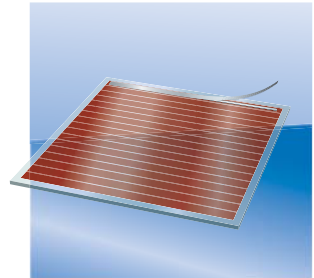
Dispensing

In the first step, the adhesive is dispensed with a dispensing needle.



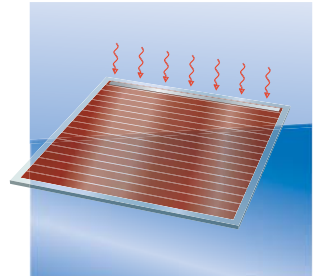
Contacting

In the second step, the metal ribbon is placed so that the adhesive spreads evenly. The adhesive amount dispensed should be adjusted in such a way that the metal ribbon area is completely wetted without adhesive overspill.



Curing

In the third step, the adhesive is cured by increasing the temperature. In general, curing can be performed before module lamination by thermode or IR heating, or during lamination. If the adhesive is cured before lamination, complete curing is recommended (no pre-curing). If the adhesive is cured during lamination, the metal ribbon should be fixed (for example, by an adhesive tape) to prevent displacement of the tap and, as a consequence, smudging of the liquid adhesive.



5.2 Processing time and dwell time in the system

In order to achieve optimum process reliability, certain dwell times of DELOMONOPOX IC adhesives in the production system must not be exceeded.

In case of DELOMONOPOX IC adhesives, this time corresponds to the processing time or storage life at room temperature (max. +25 °C). The viscosity and the reactivity of DELOMONOPOX IC adhesives remain unchanged during the processing time. If the maximum processing time is exceeded, the reaction speed decreases slowly. If a cartridge which has been conditioned to room temperature cannot be processed, it can be frozen again. However, the dwell time available after unfreezing the cartridge again is reduced by the time in which the cartridge had been conditioned to room temperature before. A cartridge must not be unfrozen more than three times.

Product	Max. dwell time in the production system at max. +25 °C	Action when exceeding the max. dwell time
DELOMONOPOX IC VE 19463	72 h	disposal
DELOMONOPOX IC VE 58573		
DELOMONOPOX IC VE 58749		

5.3 Time between dispensing, contacting and curing

In case of downtimes, for example due to machine repair in the module production line, the time between dispensing and contacting the DELOMONOPOX IC adhesives described should not exceed 5 minutes. After application of the metal ribbon (contacting), it is recommended that curing is performed preferably speedily. A time of 30 minutes should not be exceeded.

6 Curing

You can find the detailed, product-specific information on the processing of each adhesive in the specific Technical Data Sheet.

7 Trouble-shooting

The chart below gives an overview of errors which may occur while processing these products and it provides information on possible causes and remedies. If you do not reach optimum bonding results or if you have other questions regarding the application of our products, we ask you to directly contact our application experts.

Error pattern	Error	Possible causes	Remedy
Insufficient adhesion, adhesive partly remains gel-like	Insufficient curing	Wrong oven setting	Check oven
		Poor heat transfer in the oven Exceeding of the max. heating time of the components specified in the Technical Data Sheet	Increase temperatures
		Exceeding of the processing time	Exchange cartridge
		Too long storage of the batch Adhesive inhibition Cleaning of the bonding surface	Use cartridge of a new batch within the storage life Clean surface with suitable cleaner
Wetting of the surrounding areas with low-viscous adhesive parts	Strong bleeding	Too long time interval between dispensing and curing	Reduce time interval
		High roughness of the surface	If possible, adjust process parameters
Intended shear strengths are not reached	Poor adhesion	Contaminations on the surface	Check process
		Poor adhesion of the adhesive	Pretreat surface, e. g., free jet plasma
		Insufficient curing	See above

Error pattern	Error	Possible causes	Remedy
No adhesive is dispensed		Plugging of the dispensing head/dispensing needle	Cleaning of the dispensing head/dispensing needle
		Wrong dispensing parameters	Check system
		Cartridge is empty	Exchange cartridge
		Increase in viscosity due to exceeded processing time	

8 Instructions and advice for occupational health and safety

see Material Safety Data Sheet.

9 Storage

The adhesives are stored in the unopened original containers after delivery.

The adhesives must be stored in a freezer ($\leq -18\text{ }^{\circ}\text{C}$)

Storage life: see Technical Data Sheet.

10 Disposal

If the storage life of the material has been exceeded or if the product must be disposed of for any other reasons, you will find information concerning this matter in the respective valid Material Safety Data sheet. We will be glad to send it to you on demand. Cured material can be disposed of as domestic waste.

11 General

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. Verbal ancillary agreements are deemed not to exist.



CONTACT

02/14

Headquarters

DELO Industrial Adhesives

- ▶ Germany
DELO-Allee 1
86949 Windach/Munich
Phone +49 8193 9900-0
info@DELO.de
www.DELO.de

DELO Industrial Adhesives

- ▶ USA
144 North Road Suite 2650
Sudbury/Boston, MA 01776
Phone +1 978 254 5275
info@DELO.us
www.DELO.us

DELO Industrial Adhesives

- ▶ China/Shanghai
Office 628, 6/F, German Center
88 Keyuan Rd., Zhangjiang Hi-tech Park
201203 Shanghai, P. R. China
Phone +86 21 2898 6563
info@DELO.cn
www.DELO.cn

DELO Industrial Adhesives

- ▶ Singapore
German Centre Singapore #02-66/67
25 International Business Park
Singapore 609916
Phone +65 6560 0236
info@DELO.com.sg
www.DELO.com.sg

DELO Industrial Adhesives

- ▶ Taiwan
Office 824, 5F, Pacific Business Building
No. 285, Sec 4 Zhongxiao East Road
106 Taipei
Phone +886 2 6639 8248
info@DELO.com.tw
www.DELO.com.tw