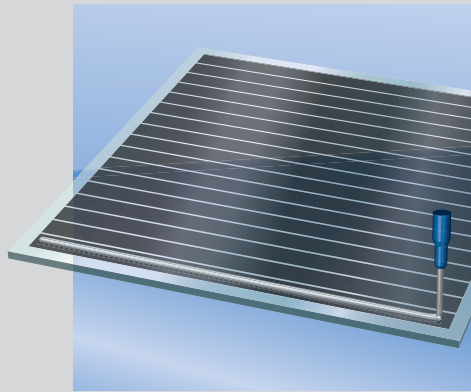


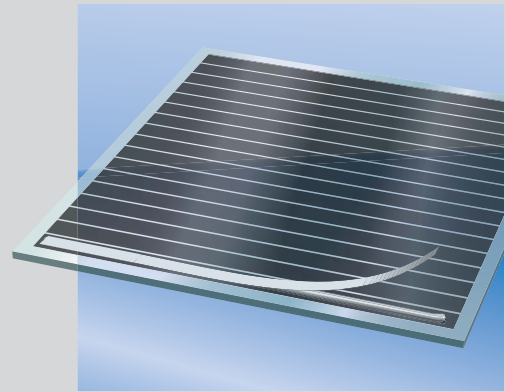
Contacting of Thin-Film Cells

Innovative Adhesives
for the Solar Industry





1 Adhesive dispensing with dispensing needle



2 Placement of the cell connector. The adhesive spreads evenly.

Electrical contacting of thin-film cells

Conductive adhesives for contacting thin-film cells

Thin-film cells provide a high degree of efficiency for photovoltaics while ensuring high throughput and constant quality. These properties make them important for reducing module production, processing, and operating expenses. However, electrical connection of thin cells during manufacture presents great challenges as cells are getting thinner and cell areas are getting larger, conventional soldering methods reach their limits.

The immense thermal stress of soldering gives rise to mechanical tensions, which can lead to microcracks in the module and loss of power.

Contacting thin-film cells with conductive adhesives subjects cells to less stress, helping make them more reliable. The adhesive curing temperature is +150 °C, much lower than in soldering. The tension-equalizing properties of conductive adhesives prevent mechanical tensions, considerably reducing the incidence of microcracks and cell failure.

Bonding technology has already proven its viability and long-term reliability in all sorts of industrial applications. This high-performance technology can also help the photovoltaics industry by enabling the efficient, high-quality, automated interconnection of thin-film cells.

The benefits to you

Efficiency

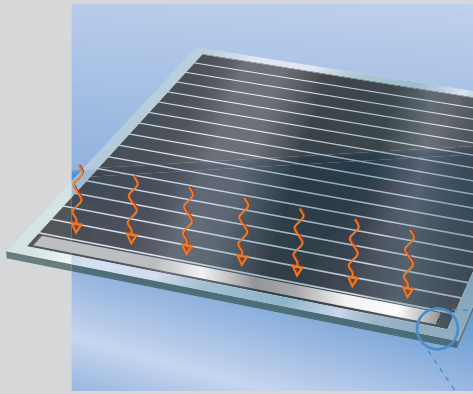
- Easy integration into existing production lines
- Reduction of cycle times thanks to the single-shot process option (lamination and adhesive curing in one process step)
- High process reliability – optimized output
- Flexible material selection
- Processing time of the adhesive up to 72 hours

Increase in quality

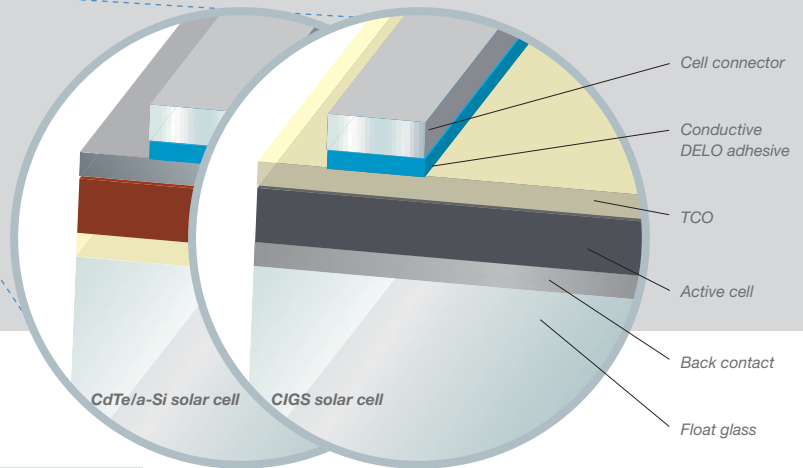
- Good adhesion
- High output
- Low thermal stress on the substrate
- No use of fluxes, and therefore no contamination in contrast to solder

Product properties

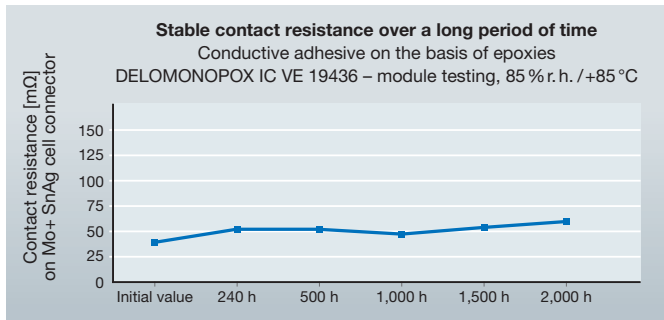
- One-component, solvent-free adhesives
- Extremely fast curing in less than 5 s
- Very good electrical conductivity even after aging
- Optimal adhesion to the substrates used in the photovoltaics industry
- Environmentally friendly production method as only lead-free substances are used
- Tension-equalizing



3 Adhesive curing by increasing the temperature



Option for contacting a thin-film cell with DELO adhesive



Adhesive	DELOMONOPOX IC VE 58573 acrylate	DELOMONOPOX IC VE 19436 epoxy
	one-component, solvent-free	
Viscosity [mPas] at +23 °C Brookfield rheometer, shear rate 2 1/s, PP20, 200 μm	85,000	60,000
Properties	<ul style="list-style-type: none"> Flexible High peel resistance Very fast curing (snap cure) Stable resistance values on zinc-plated surfaces 	<ul style="list-style-type: none"> Fast curing Stable resistance values on zinc-plated surfaces
Preferred application	Flexible thin-film cells	Rigid thin-film cells
Curing parameters [Time/°C]		
Lower limit	+110 °C	+120 °C
Upper limit	+180 °C	+180 °C
Thermode (heated plunger/IR heating)	5 sec @ +150 °C	10 sec @ +150 °C
Convection oven (laminator)	5 min @ +150 °C	10 min @ +150 °C
Storage life [-18 °C]	6 months	
Processing time at max. +25 °C	72 h	
Container size	5 cc, 10 cc, 30 cc, up to 500 g (6 oz) SEMCO cartridges	
Circuit path		
Specific resistance [Ω/cm]	1–7 x 10E-04	
Contact resistance [mΩ]	40–50	
24 h room temperature, 1206 Ω, Sn		



CONTACT

▶ **DELO** Industrial Adhesives

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

▶ **DELO** Industrial Adhesives LLC

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

▶ **DELO** Industrial Adhesives

▶ Singapore
Representative Office
Phone +65 6562 8013
info@DELO.com.sg
www.DELO.com.sg

▶ **DELO** Industrial Adhesives

▶ China/Shanghai
Representative Office
Phone +86 21 2898 6563
info@DELO.cn
www.DELO.cn

▶ **DELO** Industrial Adhesives

▶ Taiwan
Representative Office
Phone +886 2 6639 8248
info@DELO.com.tw
www.DELO.com.tw

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.

© 2011 DELO – This brochure 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.

08/11

Adhesives

Dispensing

Curing

Consulting

DELO