DELO-ML anaerobic adhesives

		low-strength		medium-strength			high-strength			heat-resistant	anaerobic light-curing		anaerobic UV-curing
Product code number		**5149**	**5198**	**5228**	**5249**	**5298**	**5327**	**5349**	**AD170**	**5449**	**DB135**	**DB136**	**DB133**
Color cured product		yellow		blue			green			red	clear / yellowish	clear / yellowish fluorescent	colorless
Viscosity [mPas] (+23 °C) Brookfield	DIN EN 12092	1,000 thix	pasty	300	1,000 thix	pasty	300	1,000 thix	9,000 thix	1,000 thix	1,200	1,200	700
Bridgeable gap [mm]	optimum clearance (D–d)	0.08	0.1	0.04	0.08	0.1	0.04	0.08	0.1	0.08	0.08	0.08	0.08
	max. clearance (D–d)	0.25	< 0.3	0.13	0.25	< 0.3	0.13	0.25	0.25	0.25	0.25	0.25	0.25
For threaded connections up to		all threads	all threads	≤ M 10	all threads	all threads	≤ M 10	all threads	all threads	all threads	all threads	all threads	all threads
Off-torque	Znph screw M 10/8.8 ISO 10964 M_{OFF} [Nm] at M_{ON} = 46 Nm	37	44	45	50	50	70	60	80	60	60	n. d.	55
Compression shear strength [MPa] with joined connections	ISO 10123	3	5	16	15	15	33	20	37	22	40	40	28
	ISO 10123 after 1 h	0.2	0.3	12	2	12	28	8	34	5	30	30	15
Tensile shear strength [MPa] steel/steel, sand-blasted	DIN EN 1465	tensile shear test not practicable					15	tensile shear test not practicable	15	tensile shear test not practicable	16	16	14
Curing time at room temperature until firmness to touch	with Znph screws [min]	5 – 8	5 – 10	2 – 5	5 – 20	10 – 15	2 – 4	5 – 20	2 – 4	5 – 10	2 – 4	2 – 4	3 – 6
	with V2A screws with DELO-QUICK 5002 [min]	20 – 40	5 – 15	15 – 20	5	5	20	5	3	15 – 25	3	n. d.	5
Minimum irradiation time [s] UVA intensity [1] 55 – 60 mW/cm²	DELO Standard 23	light curing not possible									10	10	25
Elongation at tear [%]	DIN EN ISO 527	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.	30	n. d.	130
Final strength [h]		24											
Special features of product		easy to remove securing of all threads	easy to remove sealing of surfaces run-resistant	removable threaded connections up to M 10	multi-purpose sealing of all threads sealing of pipes authorized for gas-operated installations	sealing of surfaces run-resistant	fast increased temperature stability secure bonding even on slightly oily surfaces	difficult to remove multi-purpose securing of screws	fast difficult to remove specific high-viscous setting	securing of all threads fixing for temperatures up to +200 °C	fast high-strength for flat bonding light curing possible flexible tension-equalizing	fast high-strength for flat bonding light curing possible tension-equalizing fluorescent color for adhesive detection	highly flexible impact-resistant equalizes tensions very well for flat bonding UV curing possible

[1] Intensity meter: DELOLUXcontrol
n. d. = not determinable

Product description

DELO-ML are one-component, liquid, solvent-free adhesives based on dimethacrylic esters.

Standard temperature range

DELO-ML products are normally used in a temperature range of –60 °C to +200 °C. 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

DELO-ML can be processed directly from the bottle or efficiently with DELO dispensing units.

Curing

DELO-ML anaerobic curing adhesives cure at room temperature under exclusion of air (anaerobic) with simultaneous metal contact.

DELO-ML anaerobic light-curing adhesives can either be cured under exclusion of oxygen (anaerobic) or by irradiation with UV light or visible light (320–450 nm).

DELO-ML anaerobic UV-curing adhesives can either be cured under exclusion of oxygen (anaerobic) or by irradiation with UV light (320–400 nm).

Surface pretreatment

To reach high strengths and long service lives, cleaning is indispensable.

The surfaces to be bonded must be free of oil, grease, separating agents and other contaminations. We recommend our DELOTHEN cleaners.

Adhesion can be further improved by grinding, sand blasting or pickling.

Storage life

After delivery in unopened containers at room temperature: 12 months; see also technical data sheet. The air content in the container prevents premature curing.

Use

Anaerobic-curing adhesives

- Form-closed connection of axisymmetric components, such as shaft-to-hub connections, fixing of bushes, bearings and pinions
- Securing of screws
- Sealing of pipe, screw and flange connections
- Corrosion protection in bonding gaps

Anaerobic light-curing and anaerobic UV-curing adhesives have two independent curing mechanisms.

Irradiation with light also makes possible the curing of adhesive in peripheral zones to allow fixing in seconds. Thus, components can be handled faster.

If one of the components is translucent, non-metals can also be bonded to metal.

Adhesion

Adhesion is achieved by anchorage of the tough-hard adhesive in the roughness depths of the component surface.

Some types have additional adhesive properties and, therefore, higher bond strengths on flat surfaces. Therefore, they are resistant to shear and transverse forces.

Thread connections

Thread connections should always be tightened firmly.

ISO 10 964 recommends a tightening torque of 40 Nm for comparative testing of screw joints but allows for deviations.

Screw manufacturers require a tightening torque of 46 Nm for the selected screws M 10/8.8.

This tightening torque was also used for the off-torque test mentioned here to enable a practicable comparison between tightening torque and off-torque.

Further information

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

If bonded connections have contact with aggressive media or high temperatures, high-strength or heat-resistant DELO-ML adhesives are to be used (see also DELO-ML resistance list).

Accelerated curing, pretreatment of passive surfaces

Active surfaces

Materials: Non-ferrous metals, such as copper, brass, bronze; low-alloy steel

Curing: Fast
Curing can be accelerated by using DELO-QUICK

Passive surfaces

Materials: High-alloy steels, such as, stainless steel, aluminum, zinc, chrome, molybdenum, cadmium; oxide layers; plastics; enameled metals

Curing: Delayed or no curing
Curing can be accelerated by using DELO-QUICK

Instructions for use: Spray or brush DELO-QUICK on passive surface and let it evaporate completely. Then, the components can be bonded.

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.
All standard DELOLUX HID lamps are also suitable.

Lamp type	DELOLUX 80, DELOLUX 50, DELOLUX 20		
	365	400	460
DELO-ML DB133	++	–	–
DELO-ML DB135	++	++	–
DELO-ML DB136	++	++	–

++ especially suitable
\+ suitable
– not suitable

Application examples



- **Securing of screws**
  → **DELO-ML 5249**, friction value similar to that of an oiled screw, removable, especially optimized for securing screws



- **Sealing of flanges and large threads**
  → **DELO-ML 5298**, removable, run-resistant
  → **DELO-ML 5198**, easy to remove, run-resistant



- **Pipe connections**
  → **DELO-ML 5298**, removable



- **Shaft-to-hub connections**
  → **DELO-ML 5327**, **DELO-ML DB135**, **DELO-ML DB136**, difficult to remove, high-strength bonding, long-term stable even at high dynamic stresses
  → **DELO-ML AD170**, specifically high viscosity



- **Grinded and galvanized surfaces**
  → **DELO-ML DB133**, **DELO-ML DB135**, **DELO-ML DB136**, difficult to remove, high adhesion on surfaces with low surface roughness (Rz < 10 µm), absorption of shear and transverse forces is possible



- **Fast fixing of components**
  → **DELO-ML 5327**, **DELO-ML DB133**, **DELO-ML DB135, DELO-ML DB136**, difficult to remove

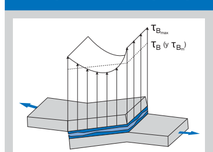


- **Use in gas-operated installations**
  → **DELO-ML 5249**, DIN EN DVGW reg. no. NE–5146 BL 0234, removable
  Curing sealants for threaded connections in fittings and gas-operated devices



- **Use at high temperatures**
  → **DELO-ML 5327**, **DELO-ML 5449**, suitable for permanent use at temperatures of up to +200 °C

New product property



- **Flexibilized setting**
  → **DELO-ML DB133**, highly flexible, impact-resistant
  → **DELO-ML DB135, DELO-ML DB136**, for bonding components with dissimilar coefficients of expansion due to tension-equalizing nature

DELO-PHOTOBOND	1-component acrylates UV-curing · light-curing
DELO-KATIOBOND	1-component epoxies UV-curing · light-activated
DELO-DUALBOND	1-component epoxies light-curing · heat-curing
DELOMONOPOX	1-component epoxies heat-curing
DELO-DUOPOX	2-component epoxies cold-curing
DELO-ML	1-component methacrylates anaerobic-curing
DELO-CA	1-component cyanoacrylates fast-curing
DELO-GUM	1-component silicones highly flexible
DELO-PUR	2-component polyurethanes cold-curing · tough-elastic
DELOTHEN	Cleaners CFC-free
DELOMAT	Dispensing units precise
DELOLUX	Curing lamps intensive

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. Many product properties are dependent on the temperature and can permanently change especially at increased temperatures. It is the user's responsibility to test the suitability of the product for the intended purpose and temperature range by considering all specific requirements. Type and 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.

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07/11

SELECTION CHART

DELO-ML

DELO



Methacrylates
one-component · anaerobic-curing