DELO®-ML DB133
anaerobic and UV-curing adhesive

**Base**
- Modified urethane acrylate
- one-component, solvent-free
- dual-curing adhesive

**Use**
- for impact-resistant metal bondings
- for mixed bondings with certain plastics, e.g., polyamide
- also suitable for the bonding of components with dissimilar coefficients
- adhesive leaking from the bonding gap can be cured in seconds with visible light therefore, firmness to touch can be reached faster
- if one of the components to be bonded is permeable to UV light, it is also possible to bond non-metals by photo-polymerization
- the cured product is normally used in a temperature range of -40 °C to +150 °C; depending on the application, other limits may be more reasonable
- suitable for small casting applications
- compliant with RoHS directive 2015/863/EU

**Processing**
- the surfaces to be bonded must be dry as well as free of dust, grease and other contaminations
- DELOTHEN cleaners are recommended for the optimal preparation of bonding areas
- thread connections must be tightened well
- the adhesive is good to dispense from original containers or by means of dispensing systems suitable for anaerobic-curing adhesives
**Curing**
- anaerobic, i.e., by exclusion of air and under metal influence at room temperature with small gap
- the curing may be assisted by application of heat, use of activator and/or light, e.g. if the curing speed is too slow or if it comes to larger gaps
- the build-up of strength depends on the components and the geometry joined. The initial strength is achieved after just a few minutes. Significant acceleration is possible by using an activator and/or applying heat
- curing with UV light in a wavelength range of 320 – 380 nm. DELOLUX LED curing lamps are especially suitable as per the chart below. All standard DELOLUX HID discharge lamps are also suitable
- both curing mechanisms can be used in combination or separately

<table>
<thead>
<tr>
<th>Lamp type</th>
<th>DELOLUX 20 / 50 / 80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength [nm]</td>
<td>365</td>
</tr>
<tr>
<td>Suitability</td>
<td>++</td>
</tr>
</tbody>
</table>

- not suitable | + suitable | ++ especially suitable

**Properties**
- flexible, tension-equalizing, impact-resistant
- UV-curing and anaerobic-curing
- visible adhesive in boundary areas can be cured with UV light

**Technical data**
- Color: colorless transparent
- Joint gap anaerobic [mm]: 0,05-0,1
- Joint gap with heat or activator [mm]: 0,3-0,4
- Joint gap with light curing [mm]: 4
- Density [g/cm³]: at room temperature (approx. 23 °C) 1.1
- Viscosity [mPas]: at 23°C, rheometer, PP20, gap 100µm, shear rate 10 1/s 730
- Viscosity [mPas]: at 23 °C, Brookfield spm 3/10 700
- Curing time until initial strength [min]: approx. 3-6 at room temperature (approx. 23 °C), anaerobic on zinc-phosphated screws
- Curing time until final strength [h]: 24 at room temperature (approx. 23 °C), anaerobic on zinc-phosphated screws
- Minimal irradiation time [s]: 25 DELO Standard 23, UVA intensity: 60 mW/cm², DELOLUXcontrol
- Curable layer thickness [mm]: DELO Standard 20 1
- Curable layer thickness [mm]: DELO Standard 20 UVA intensity: 55 - 60 mW/cm² DELOLUXcontrol, DELOLUX 03 1
- Curable layer thickness [mm]: DELO Standard 20 LED 365 nm, intensity: 200 mW/cm² DELOLUXcontrol 1
- Off-torque without M(on) [Nm]: 30
- Off-torque with M(on) 46 Nm [Nm]: 55
Compression shear strength after 1 h [MPa] according to ISO 10123
15

**Compression shear strength** [MPa] according to ISO 10123
28

**Compression shear strength glass/glass** [MPa]
DELO Standard 5
LED 365 nm, intensity: 200 mW/cm², DEOLONXcontrol, irradiation time: 60 s
curing time: 24 h at room temperature (approx. 23 °C)
30

Compression shear strength PMMA/PMMA [MPa]
DELO Standard 5
LED 365 nm, intensity: 200 mW/cm², DEOLONXcontrol, irradiation time: 60 s
curing time: 24 h at room temperature (approx. 23 °C)
10

Compression shear strength PS/PS [MPa]
DELO Standard 5
UVA intensity: 55 - 60 mW/cm², DEOLONXcontrol, irradiation time: 60 s
13

Compression shear strength PA/PA [MPa]
DELO Standard 5
LED 365 nm, intensity: 200 mW/cm², DEOLONXcontrol, irradiation time: 60 s
curing time: 24 h at room temperature (approx. 23 °C)
18

Compression shear strength steel/PA [MPa]
DELO Standard 5
LED 365 nm, intensity: 200 mW/cm², DEOLONXcontrol, irradiation time: 60 s
curing time: 24 h at room temperature (approx. 23 °C)
10

Compression shear strength stainless steel/PA [MPa]
DELO Standard 5
curing: 24h at room temperature
with DELO-QUICK 5002
6

**compression shear strength stainless steel/PPA** [MPa]
DELO Standard 5
curing: 24h at room temperature
with DELO-QUICK 5002
16

**compression shear strength stainless steel/PPS** [MPa]
DELO Standard 5
curing: 24h at room temperature
with DELO-QUICK 5002
3

**Tensile shear strength Al/Al** [MPa]
DIN EN 1465, blank
component thickness: 1.6 mm
5

**Tensile shear strength Al/Al** [MPa]
DIN En 1465, sand-blasted
component thickness: 1.6 mm
12

**Tensile shear strength St/St** [MPa]
DIN EN 1465, blank
11

**Tensile shear strength St/St** [MPa]
DIN EN 1465, sand-blasted
14

**Young's modulus** [MPa]
according to DIN EN ISO 527
300

**Tensile strength** [MPa]
according to DIN EN ISO 527
20

**Elongation at tear [%]**
according to DIN EN ISO 527
130

**Shore hardness D**
according to DIN EN ISO 868
44
Glass transition temperature [°C] 104
rheometer

Coefficient of linear expansion [ppm/K] 156
TMA, in a temperature range of +30 to +95 °C

Coefficient of linear expansion [ppm/K] 171
TMA, in a temperature range of +30 to +150 °C

Coefficient of linear expansion [ppm/K] 184
TMA, in a temperature range of +95 to +150 °C

Shrinkage [vol. %] 8.6
DELO Standard 13

Specific volume resistance [Ωcm] >1xE16
VDE 0303, part 30

Surface resistance [Ω] >1xE14
VDE 0303, part 30

Creep resistance CTI >600 M
VDE 0303, part 11, DIN EN 60112

Performance under chemical influence
compression shear strength after storage for 1,000 h
based on initial value at room temperature
measured at room temperature (approx. 23 °C)
according to ISO 10123

<table>
<thead>
<tr>
<th>Chemical medium</th>
<th>Compression/shear strength shaft-hub joint [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATF gear oil</td>
<td>95</td>
</tr>
<tr>
<td>Diesel fuel</td>
<td>94</td>
</tr>
<tr>
<td>engine oil</td>
<td>96</td>
</tr>
<tr>
<td>fuel</td>
<td>89</td>
</tr>
</tbody>
</table>
Performance under temperature influence

Compression/shear strength shaft-hub joint after temperature storage measured at room temperature (approx. 23 °C) based on initial value at room temperature measured at room temperature (approx. 23 °C) according to ISO 10123

![Compression/shear strength graph](chart1)

Tensile strength after temperature storage based on initial value at room temperature measured at room temperature (approx. 23 °C) according to DIN EN 527, test specimen type 1B, thickness 2 mm

![Tensile strength graph](chart2)

Elongation at tear after temperature storage based on initial value at room temperature measured at room temperature (approx. 23 °C) according to DIN EN 527, test specimen type 1B, thickness 2 mm

![Elongation at tear graph](chart3)

Young’s modulus after temperature storage based on initial value at room temperature measured at room temperature (approx. 23 °C) according to DIN EN 527, test specimen type 1B, thickness 2 mm

![Young's modulus graph](chart4)

Storage life at 0 °C to +10 °C
In unopened cartridge <= 600ml 6 months

Storage life at room temperature (max. 25 °C)
In unopened cartridge <= 200ml 9 months
Instructions and advice

Instructions for use
The instructions for use of DELO-ML are available on: www.DELO.de. We will be pleased to send them to you on demand.

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 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.

Occupational health and safety
see material safety data sheet

Specification
The properties in italics are part of the specification. Ranges with clear limits are defined for them and others, where applicable. In the course of the QA test, each batch is tested for these properties and the maintenance of the limits is ensured. The measuring methods used can deviate from those specified in the data sheet. Details can be found in the QA test report.