Adhesives for E-Motors
Adhesives for e-motors

DELO’s adhesives for …

When manufacturing modern e-motors, it is essential to improve the efficiency, for example by minimizing the air gap between magnet and winding. Since conventional methods, such as mechanical clamping or wrapping reach their limits due to high tolerances, bonding is the solution.

The requirements imposed on the e-motor components to be joined (and therefore also on the adhesives used) are high. In this respect, recurring buzz words such as temperature-resistant, media-resistant, gap-filling, impact-resistant and tension-equalizing are often used. The adhesives specially developed for e-motors have precisely these properties.

The overview on the left shows a selection of DELO adhesives used in specific e-motor applications according to their properties.

FAST PROCESSES
(LIGHT FIXATION < 10 S)

DELO-ML DB,
DELO DUALBOND

HIGHLY RELIABLE
CASTING

DELO-DUOPOX CR,
DELO MONOPOX GE

HIGH TOLERANCES,
GAP-FILLING

DELO-DUOPOX,
DELO-PUR

HIGH-TEMPERATURE
APPLICATIONS (+220°C)

DELO MONOPOX HT

CR = Casting Resin
DB = Dual Bonding
GE = General Encapsulant
HT = High Temperature
Magnet bonding

More and more e-motor magnets are bonded as adhesives have several property and process advantages over conventional mechanical joints:

- Tolerance compensation
- Evenly distributed stress
- Easy to automate
- Reduced vibration noise
- Good corrosion protection
- No component damage during joining

Your benefits

- High temperature stability up to +220 °C
- Excellent media resistance
- Good gap filling
- Fast light fixation (< 10 s)
- Tension-equalizing

Find the right adhesive ...

- **FAST FIXATION**
  - DELO-ML DB140 DB180
  - Dual curing anaerobic / light
  - Fixation in less than 10 s with DELOLUX 20 or DELOLUX 80

- **IMPACT-RESISTANT**
  - DELO-ML 5327
  - Anaerobic curing
  - Temperature resistance up to +200 °C
  - Fast fixation with activator

- **GAP-FILLING > 250 μm**
  - DELO-DUOPOX SJ8665 DELO-PUR 9694
  - 2C adhesives
  - Peel resistance

- **HIGH TEMPERATURE STABILITY ≥ +200 °C**
  - DELO DUALBOND SJ2718
  - 1C epoxy
  - Fast induction curing
  - Light fixation

- **DELO MONOPOX HT2860**
  - 1C epoxy
  - Impact resistance
  - Fast induction curing

- **DELO MONOPOX SJ2981**
  - 1C epoxy
  - High run resistance
Bonding the stator laminations to the housing is more advantageous than conventionally joining these components by pressing or shrinking:

- Equalize tensions between the stator and housing with dissimilar CTEs
- Heat not mandatory
- More cost-efficient production
- Improved acoustics by damping properties of the adhesive
- Larger production tolerances possible

Your benefits

- High temperature stability up to +200 °C
- Fast light fixation for short cycle times (DELO-ML DB)
- Accelerated curing with activator (DELO-ML)
- Curing at room temperature (except for DELO MONOPOX)

Find the right adhesive ...

- DELO-ML DB140 DB180: Dual curing anaerobic/1K
  Fixation in less than 10 s with DELOLUX 80
- DELO-ML 5327: Anaerobic curing Fast fixation with activator
- DELO-DUOPOX SJ8665: 2C epoxy Peel resistance Curing can be accelerated by heat
- DELO DUALBOND SJ2718: 1C epoxy Good flow behavior Fast induction curing Light fixation

DB = Dual Bonding  SJ = Structural Joining
Shaft bonding

Similar to shaft-to-hub bonds in mechanical engineering, the shaft of e-motors is bonded to the bearing, rotor package and commutator. Anaerobic-curing, low-viscous adhesives are preferred as the bonding gap is narrower due to very low tolerances. Adhesive bonds have the following advantages over classical form- or force-closed joints:

- Low component production costs
- Easy to automate
- No clearance, no slip
- No friction or contact corrosion

Your benefits

- Fast fixation by activator or light (DELO-ML)
- Curing at room temperature (DELO-ML, DELO-DUOPOX)
- Very high temperature stability up to +220 °C (DELO MONOPOX)

Find the right adhesive ...

**Dual curing anaerobic/light**
- Fixation in less than 10 s with DELOLUX 80

**Anaerobic curing**
- Temperature resistance up to +200 °C
- Fast fixation with activator

**2C epoxy**
- Peel resistance

**1C epoxy**
- Good flow behavior
- Fast induction curing
- Light fixation

**Temperature resistance up to +220 °C**
- Impact resistance
Casting compounds are used in e-motors to protect sensitive components from humidity, media or mechanical stress. Therefore, DELO’s adhesives are used in the automotive industry due to these special challenges. Possible applications:

- Secure coil wires against vibration
- Cover soldered and welded contacts to protect them against corrosion
- Partial protection of windings from abrasive substances
- Stator casting

Your benefits

- Excellent resistance to aggressive substances (e.g. gear oil)
- Outstanding thermal resistance and low thermal expansion combine to minimize tensions between cast and component
- Very fast fixation or curing by light

Find the right adhesive …

- DELO-DUOPOX CR8031
  2C casting resin
  Curing can be accelerated by heat
- DELO KATIOBOND 49852
  Light-activated Irradiation time of 60 s or less with DELOLUX 80
- DELO DUALBOND AD465
  Dual curing light/humidity Fast light curing in less than 4 s with DELOLUX 80
- DELO MONOPOX GE727
  1C casting resin
  CTE 11 ppm/K
- DELO-DUOPOX CR8715
  2C casting resin
  CTE 29 ppm/K
- DELO MONOPOX GE765
  1C casting resin
  High run resistance
  CTE 22 ppm/K
- DELO DUALBOND AD761
  Dual curing light/heat
  Irradiation time of 30 s or less with DELOLUX 80
- DELO DUALBOND AD465
  Dual curing light/heat
  Fast light curing in less than 4 s with DELOLUX 80
DELO is a technology leader, generating about 30 percent of its sales revenues with products developed in the last three years. In addition, 15 percent of revenues are invested in the research and development of adhesives and associated equipment.

These statistics are a result of the enormous laboratory expertise in the Windach headquarters: Comprehensive analytics and lab tests make it possible to find the right adhesive for every bonding task, including those in e-motor bonding.

In addition to chemical-physical characterization of adhesives, life cycle tests, application-specific test methods and process simulations are performed.

ADDITIONAL BONDING TASKS

A COMPREHENSIVE OVERVIEW of pretreatment methods can be found in the “BOND it – Reference Book on Bonding Technology”.

E-MOTOR PROCESS VIDEO
www.youtube.com/DELOadhesives
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