

# BODO MÖLLER CHEMIE

*Engineer chemistry*



Materials for  
composite applications

# Adhesives for composite applications

With our high-performance adhesives based on epoxy, polyurethane and methyl methacrylate for composite applications, composite materials and other materials can be joined effectively to achieve high-strength, high-performance connections. Structure, appearance and performance of the composite material are preserved. We supply a wide range of international markets such as aerospace, shipbuilding, wind energy, sport and leisure, railway and the automotive industry. These products complement our wide range of laminating resins and other products for composite applications.

Pot life in min. (100g at 23 °C)	Reactivity in min. (Cure time at 23 °C to LSS=1 N/mm <sup>2</sup> )	Mechanical properties in N/mm <sup>2</sup> (E-modulus at 23 °C)	Mechanical properties in % (Elongation at break at 23 °C)	Bond strength in N/mm <sup>2</sup> (LSS aluminium at 23 °C)
60	360	1000	5	19
110	270	1600	4	33
150	360	1600	7	38

## Araldite® Adhesive systems for demanding composite applications

### EPOXY BASIS

#### Araldite® 2031

- Optimal for bonding of composite materials and metal, good adhesion on polyamides
- Toughened adhesive
- Black, thixotropic

#### Araldite® AW 4859 / HW 4859

- Very high lap shear and peel strength, temperature resistant up to 140 °C, extremely tough and resilient adhesive
- Black, thixotropic
- Bonds a wide variety of materials (metals, composites and thermoplastics).

#### Araldite® AW 4858 / HW 4858

- Very high lap shear and peel strength, good moisture resistance, extremely tough and resilient adhesive
- Black, thixotropic
- Long pot life, ideal for large composite part assemblies
- Bonds a wide variety of materials (metal, composite and thermoplastics)

Specifications	Pot life in minutes	Operating temperature in °C
Airbus: AIMS 10-04-006	60	60
Airbus: ABP 5-1158 Fokker: FMS 4140	65	60
Airbus: AIMS 10-04-020, DAN 1284-01	100	60
Lockheed Martin: LAC 30-4639-0200	30-60	150
	50-55	<82
Cirrus: E0000061	100-120	<148,9
Airbus: ASNA 4125 Boeing: BMS 5-107	60	70
Airbus: ABR 2-0181, ABP 5-1158	35	80
Embraer: MSRR 9332 Rolls Royce: MEP 09-022	35	120

LSS = Lap Shear Strength

## Araldite® · Epibond® Adhesives for aerospace

### EPOXY BASIS (CURING AT ROOM TEMPERATURE)

#### Araldite® 1570 FST

- 2-component self extinguishing adhesive, thixotropic paste, dark grey
- Meets requirements of FAR/JAR 25.853 App. F

#### Araldite® 2013

- Non sagging up to 5 mm, pasty

#### Araldite® 2011

- Tough adhesive, non sagging paste

#### Epibond® 1210-A / Hardener 9861

- Low outgassing

#### Epibond® 8000 FR

- High strength & high modulus structural adhesive
- Meets requirements of FAR/JAR 25.853 App. F

#### Epibond® 100

- High hot/wet Tg performance
- Elevated temperature performance for composites and dissimilar substrates

#### Araldite® 420 A/B (available in EU)

- Tough adhesive, non sagging paste, good peel strength

#### Araldite® 2015

- Tough adhesive, non sagging up to 10 mm

#### Araldite® AV 138 M-1 / Hardener HV 998

- Low outgassing, gap filling properties
- High chemical resistance, thixotropic

## Araldite® Adhesives for renewable energy/wind energy

### EPOXY BASIS

#### Araldite® 2014-1

- Bonding tip, control shaft components, ideal for metals
- High temperature and chemical resistance

#### Araldite® 2015

- Bonding of lightning conductor, monitor sensors, ideal for dissimilar substrates, Germanischer Lloyd (GL) certified

#### Araldite® AV 138 M-1 / Hardener HV 998

- Bonding of switching waves and vibration dampers

#### Araldite® AW 5047-1 / Hardener 5067

- Liquid system, resistant up to 180°C (LSS > 5 MPa)
- Ideal for metal bonding

#### Araldite® AW 4510 / Hardener 4511

- Non sagging paste, high temperature resistance. For gap filling or vertical application

### METHYL METHACRYLATE BASIS

#### Araldite® 2021-1

- Tough adhesive for rapid fixing and filling of small voids, very fast setting

#### Araldite® 2022-1

- Tough adhesive for field/workshop operations
- Medium open time and fast curing

#### Araldite® 2047-1

- Multipurpose adhesive, ideal for dissimilar substrates, rapid attachment of parts

#### Araldite® 2048

- Gap filling adhesive for rapid attachment of parts, high flexibility and elongation at break
- Ideal for bonding of plastics and metal

### POLYURETHANE BASIS

#### Araldite® 2029-1

- Long open time adhesive, high shear strength and elongation at break

Gap filling in mm	Pot life in min. <sup>1</sup> (500g at 23 °C) <sup>2</sup> (100g at 23 °C)	Lap shear strength in Mpa
5	50–65 <sup>1</sup>	15–18
10	45–60 <sup>1</sup>	15–18
5	40–55 <sup>1</sup>	15–18
< 0,5	65–80 <sup>1</sup>	20–22
10	85–100 <sup>1</sup>	14–16
3–5	3–7 <sup>2</sup>	20–22
3–5	8–15 <sup>2</sup>	20–22
3–5	8–15 <sup>2</sup>	10–14
5–8	6–12 <sup>2</sup>	20–22
3–5	40 <sup>2</sup>	20–24

## Araldite® Adhesives for shipbuilding

#### Araldite® 2013

Mix ratio (pbv), 100:60, thixotropic

#### Araldite® 2015

Mix ratio (pbv), 100:100, thixotropic

#### Araldite® 2022

Mix ratio (pbv), 100:94, thixotropic

#### Araldite® 420 A/B (available in the EU)

Tough adhesive, non sagging paste, good peel strength – Specifications: ASNA 4125, BMS, issue B

Gap filling in mm	Pot life in minutes	Curing time in min./°C
5	50–80	600/23 or 6/100
10	30–40	600/23 or 35/70
0–4	10	30/23 or 12/600
–	50–70	240/70 or 7 days at RT

## Araldite® · Aradur® Adhesives for sports and leisure

#### Araldite® AW 1106 / Aradur® 1953-2

Mix ratio (pbv), 100:80

#### Araldite® AW 1136 / Aradur® 5049-1

Mix ratio (pbv), 100:80

#### Araldite® AW 1137 / Aradur® 5049-1

Mix ratio (pbv), 100:30

Setting time in minutes (at 60 °C)	Pot life in minutes (at 23 °C)	Curing time in min./°C
30–36	120–150 (100 ml)	180/40 or 50/70 or 10/100
18–24	70–80 (200 ml)	60-90/60 or 20–35/80 or 7–16/100 or 3,5–9/120
18–24	70–80 (200 ml)	60–90/60 or 20–35/80 or 7–16/100 or 3,5–9/120

### Araldite® 2033

- Two-component epoxy adhesive, self-extinguishing, UL 94 V-0
- Gap filling, medium open time, high strength
- Suitable for panels isolated with structural composites

Rating according to EN 45545-2: HL3 for R22, R23

### Betamate™ 2700

- Two-component polyurethane adhesive, high viscous, long open time
- Cures independent from humidity
- Very good elongation properties, excellent long term durability under dynamic stress
- Designed for glass, side panel and roof module gluing as well as structural bonding

Rating according to EN 45545-2: HL1/HL2/HL3 for R22, R23

### Betamate™ 7120

- One-component polyurethane adhesive, moisture curing
- Cold processable, high viscous, low modulus adhesive
- Very good bead stability, for high-strength, permanently elastic adhesive joints
- Excellent for glass bonding

Rating according to EN 45545-2: HL1/HL2/HL3 for R1, R7, R10, R22, R23

### Betamate™ 7170

- One-component polyurethane adhesive, moisture curing
- Warm processable, high viscous, high modulus, low conductive adhesive
- Very good bead stability, high initial strength
- Suitable for glass bonding

Rating according to EN 45545-2: HL1/HL2/HL3 for R10, R22, R23 – HL1/HL2 for R1, R7

HL = Hazard Level (HL1-HL3) · R = Requirements (R1-R26)

## Betamate™ · Betaforce™

### Adhesives for automotive construction

#### Betamate™ 2810

Elongation at break 230% / processing time 6–8, 8–10 or 10–15 minutes

- Very low shrinkage (< 1%)
- **Temperature resistance:** -40°C, temporary up to 160°C (0,5h)
- **Chemical resistance:** Highly resistant to dilute aqueous solutions of chemicals, gasoline and alcohols; conditionally to esters, ketones, aromatic and chlorinated hydrocarbons

#### Betaforce™ 2850

Elongation at break 250% / processing time 4–6 or ~30 minutes

- Medium tough, elastic two-component polyurethane adhesive
- Fast curing at room temperature. Very low shrinkage (< 1%)
- **Temperature resistance:** -40°C to +100°C, temporary up to +160°C (0,5h)
- **Chemical resistance:** Highly resistant to dilute aqueous solutions of chemicals, gasoline and alcohols; conditionally to esters, ketones, aromatic and chlorinated hydrocarbons

#### Betaforce™ 9050

Elongation at break 80% / processing time 6–10 or 30 minutes

- Two-component polyurethane adhesive
- With high modulus and moderate curing time at room temperature. Very low shrinkage (< 1%)
- **Temperature resistance:** -40°C to +170°C (0,5h)
- **Chemical resistance:** Highly resistant to dilute aqueous solutions of chemicals, gasoline and alcohols; conditionally to esters, ketones, aromatic and chlorinated hydrocarbons

#### Betamate™ 2098

Elongation at break 30% / processing time 60 minutes

- Crashresistant two-component structural adhesive
- Improved body stiffness and crash stability
- Very good stability of bond and adhesive
- Compatible with other thermal and mechanical joining processes

#### Application

For semi-structural bonding of plastics and composites parts, tailgates, trunklids, sunroofs

For semi-structural bonding e.g. of add-on parts in the vehicle  
Structural: roof modules, coated steel, aluminum, steel  
For the bonding of plastics, composite materials and coatings that are adhered to themselves and to one another

For the bonding of composite materials such as CFRP, SMC and BMC and painted steel components which are bonded both with themselves and with each other  
Structural: driving cabin  
Suitable for bonding without primer, with a significant shortening of handling strength is achieved by introduction of heat

Excellent adhesion on the steels used in automotive, including coated steels and pre-treated aluminum  
Suitable for sealing and thus protects both the metal and welds against corrosion

#### Advantages and properties for adhesives for automotive construction

- ▶ Fast strength development: 1 MPa after <60 sec (with induction, infrared)
- ▶ Excellent mechanical behavior over temperature. No significant loss of modulus/strength values (-45°C up to +180 °C)
- ▶ Broad product portfolio: Lap shear strength ~10-28 MPa / Elongation at break 10-250% / G-module 9-400 MPa / Open times 3-40 minutes
- ▶ Combination of high modulus and high elongation at break
- ▶ Mixing ratio 1:1
- ▶ Very good bead stability

## Carbon fiber reinforcements

Our high-quality carbon fiber products from Sigmatex are suitable for all applications which demand a high level of quality and reliability as in the aerospace, automotive and transportation sectors as well as in shipbuilding and further industrial applications. The carbon fiber fabrics fulfill many different requirements, such as fiber orientation, drapability, thickness and resin permeability. PAN and PITCH based carbon fibers and exotic yarns can be converted into woven, unidirectional, multiaxial and 3D fabrics of various weights, weave styles and architectures.

- ▶ **sigma2D** Woven carbon fabrics
- ▶ **sigmaUD / sigmaMX** Unidirectional and multiaxial carbon fabrics
- ▶ **sigmaIF** Innegra fabrics made of high modulus polypropylene fibers

**HUNTSMAN**

Enriching lives through innovation

## Resins and release agents

### Araldite® resins and systems

We offer a unique and wide range of innovative and proven resin systems for all liquid resin applications from wet lay-up, filament winding and pultrusion, to infusion, RTM and prepreg manufacturing, combined with strong technical support to the industries using fiber reinforcement technologies. Our product solutions open new possibilities in design and systems integration with high strength-to-weight and stiffness-to-weight ratios, as well as superior mechanical and thermal performance. Resin systems comply with the industry standards.

### Epoxy and polyester resins

BODO MÖLLER CHEMIE consolidates the technologies of notable manufacturers and offers a broad range of epoxy and polyester resin solutions for fine-tune high performance applications in the composites sector to meet customer's needs the best way. Our epoxy product line includes liquid resins, solid resins, blends, solutions and other epoxy derivatives.

### Release agents for epoxy and polyester resins

Release agents achieve more than just trouble-free demoldings. They have a determining influence on mechanical (scratch resistance & gliding properties), visual (gloss & brightness) and tactile qualities. The product range covers standard products as well as tailored products for specific requirements.

## Quality and safety

**ISO 9001** Quality Management

**ISO 14001** Environmental Management

**OHSAS 18001** Occupational Health and Safety

**EN 9120** Distribution and Repacking for Aviation Industry

**DIN 6701** Adhesive Bonding of Railway Vehicles and Parts for Adhesive Applications Laboratory

**Responsible Care®**

**ESAD/SQAS**

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