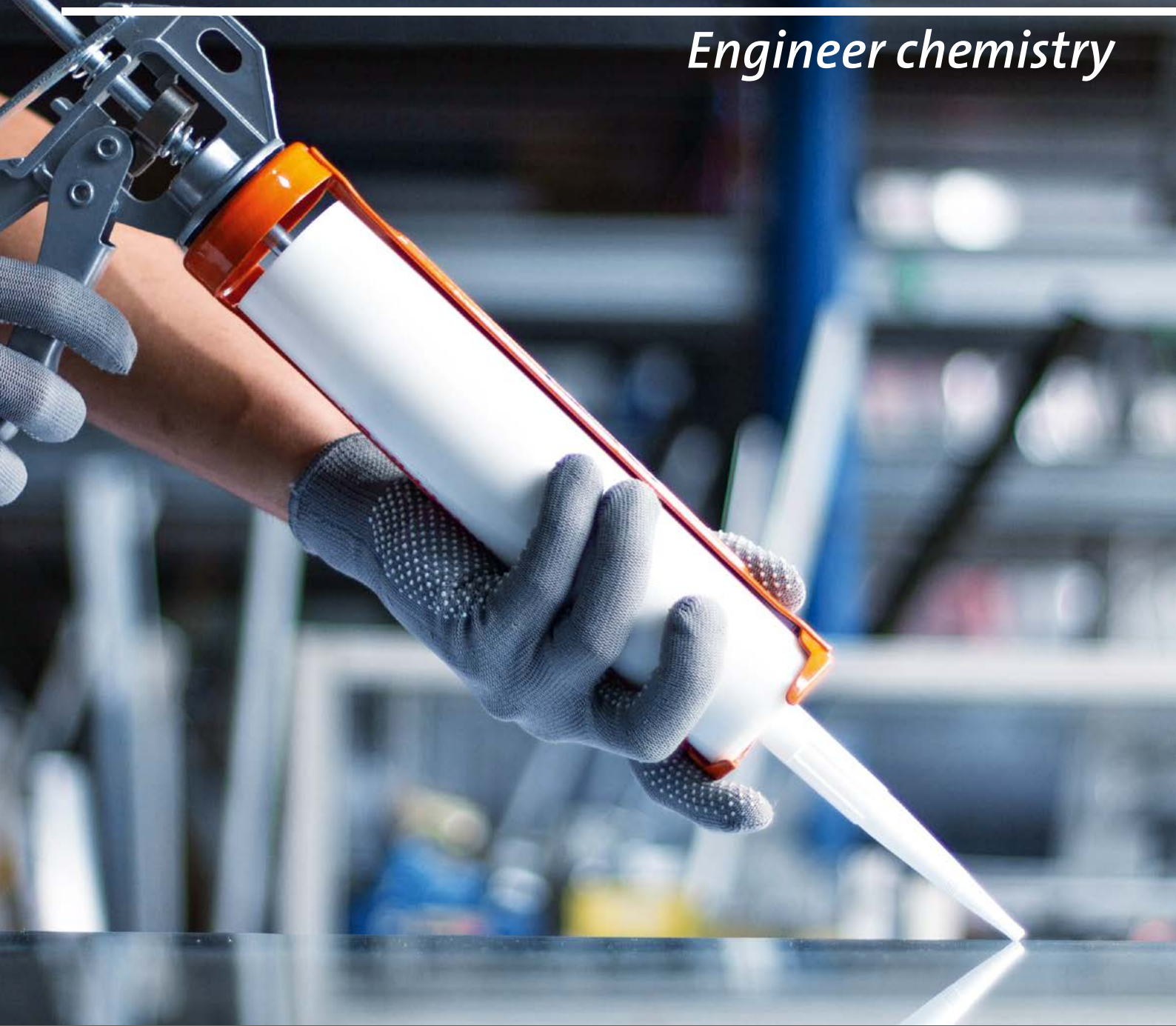


BODO MÖLLER CHEMIE

Engineer chemistry



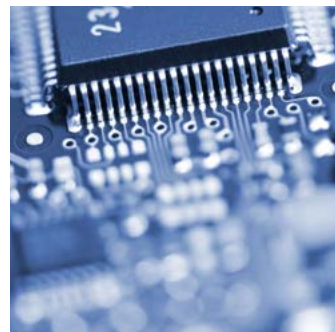
Adhesive systems
for industrial applications



Adhesive solutions

BODO MÖLLER CHEMIE is a specialist for adhesive systems and applications in many industrial areas, especially in the automotive, railway, aerospace, medical and electronics industries. We offer a wide range of solutions specifically tailored to structural, semi-structural or elastic bonding of different materials like metal, glass, composites, wood and plastic.

We support customers with individual services such as design of adhesive joints and testing in our adhesive laboratory, process testing and troubleshooting, customer-specific training as well as preparation and implementation of certification audits in accordance with DIN 6701 and DIN 2304.



for various industries

Adhesive solutions

Epoxy resin adhesives (EP)

Araldite® Epoxy resin adhesives (1C / 2C)

Araldite® Epoxy core and edge fillers (2C)*

BETAMATE™ Epoxy resin adhesives (1C / 2C)

Epibond® Epoxy resin adhesives (2C)

Epocast® Epoxy core and edge fillers (1C / 2C)*

LOCTITE® Epoxy resin adhesives (2C)

* partially with FR/FST fire properties

Polyurethane adhesives (PUR)

Araldite® Polyurethane structural adhesives (2C)

BETAFILL™ Polyurethane sealants (1C)

BETAFORCE™ Polyurethane structural adhesives, high modulus (2C)

BETALINK™ Polyurethane semi-structural adhesives (1C / 2C)

BETAMATE™ Polyurethane structural adhesives (1C / 2C)

BETASEAL™ Polyurethane adhesives for direct glazing (1C / 2C)

Uralane® Polyurethane adhesives (2C)

Methyl methacrylate adhesives (MMA)

Agomet® Methyl methacrylate adhesives (No-Mix / 2C)

Araldite® Methyl methacrylate adhesives (2C)

Anaerobic adhesives

Anaerobic adhesives and sealants

Cyanoacrylate adhesives

LOCTITE® Cyanoacrylate

Phenolic resins & polycondensation adhesives

Araldite® Phenolic polycondensation adhesives

Hybrid adhesives & sealants

BETAMATE™ Silane-modified polymer adhesives (1C)

LOCTITE® Hybrid adhesives (2C)

L&L Seal Silane-modified polymer adhesives (1C)

PACTAN Silane-modified polymer adhesives (1C)

Silicone adhesives & high temperature silicones

Bluesil™ RTV silicones (2C)

CAF® Silicone adhesives (1C / 2C)

Dowsil™ Silicone adhesives and sealants

PACTAN Silicone adhesives and sealants (1C / 2C)

UV-curing adhesives

LOCTITE® UV-Alkoxy silicones

LOCTITE® UV-Cyanoacrylate

LOCTITE® Acrylate

LOCTITE® Acrylate Urethane



Hotmelt & packaging adhesives

Aquence® Water-based adhesives

Euromelt® Polyamide hotmelt adhesives

Technomelt® Hotmelts

Sealants

BETAFILL™ Polyurethane sealants

BETAFILL™ Polyurethane seam sealer (1C)

BETAGUARD™ Rubber-based sealants, relining adhesives

Bluesil™ RTV silicones (2C)

CAF® Silicone adhesives (1C / 2C)

CeraPur® Polyurethane foam gasket (1C)

Dowsil™ Silicone adhesives and sealants

L&L Acoustic sealants

L&L Core splice adhesives

L&L Hybrid sealants

L&L Room temperature curing sealants/adhesives

PACTAN Silicone and hybrid sealants

RTF Silicone foam gasket (2C)

Products for pretreatment & posttreatment of adhesive surfaces

BETACLEAN™ Surface cleaners

BETAPRIME™ Primer

BETAWIPE™ Activators

BONDERITE® Cleaners

BONDERITE® Pretreatment technologies

LOCTITE® Activators & cleaners

LOCTITE® Polyolefin primer for pretreatment

For any application

The construction with adhesive joints has several advantages compared to conventional joining technologies. Adhesives are suitable for bonding a variety of different materials. With the correct surface treatments most metallic, glass, plastic and polymer composite materials can all be joined to either themselves or each other with joint strengths superior to other joining techniques.

Due to the continuous nature of adhesive bonding, it helps reducing high stress concentrations that occur in mechanical fastening systems and results in stiffer joints and structures. Superior fatigue resistance can be achieved compared with welded or riveted joints. A continuous bead of adhesive can also provide sealing properties. In addition to the mechanical properties, bonding also brings aesthetic advantages. Compared to welding or mechanical fasteners, the adhesive seam can be applied invisibly.

Adhesive family properties comparison

	Speed		Substrate diversity										Stability			Safe handling		
	Hand strength, time	Final strength, time	Plastic	Metals	Elastomers	Glass	Fibre composites (CFRP / CFRP)	Paper / Cardboard	Wood	Textiles	Leather	Concrete / Stone	Ceramics / Porcelain / Clay	Impact strength & resistance	Chemical resistance	Moisture sensitivity	EHS Classification labeling	Smell
1C-Epoxy resin adhesives (EP)	■	■	■	●	■	■	●	●	●	■	■	●	●	●	●	●	■	●
2C-Epoxy resin adhesives (EP)	■	▲	■	●	■	■	●	●	●	■	■	●	●	●	●	●	■	●
Polyurethane adhesives (PUR)	■	▲	●	■	■	■	●	●	●	■	■	●	●	●	●	▲	■	●
Methyl methacrylate adhesives (MMA)	●	●	●	●	■	■	●	▲	▲	▲	▲	●	●	●	●	●	■	▲
Phenolic resins & polycondensation adhesives	●	●	▲	●	▲	▲	▲	▲	▲	▲	▲	▲	●	■	●	●	■	■
Silicone adhesives & high temperature silicones	■	▲	■	■	▲	●	■	■	■	■	■	●	●	●	●	●	●	■
Hybrid adhesives & sealants	■	▲	●	■	▲	●	●	■	●	■	■	●	●	■	■	●	●	●
Cyanoacrylate adhesives	●	●	●	■	●	▲	●	●	●	●	●	●	●	■	■	▲	●	■
Hotmelt adhesives	●	●	●	■	●	■	■	●	■	●	●	■	■	■	●	●	●	●
Anaerobic adhesives	■	▲	▲	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	■	●	■	●	●

● = good ■ = medium ▲ = bad



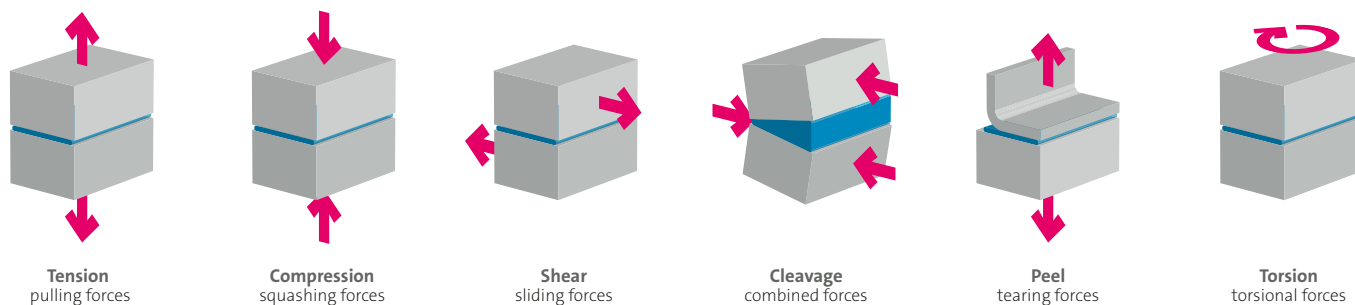
Advantages and applications of adhesive systems

	Advantages	Applications
1C-Epoxy resin adhesives (EP)	High strength, crash-stable	Automotive, General Industry
2C-Epoxy resin adhesives (EP)	High strength, very versatile, environmental resistance, cure speed	General Industry, Aerospace, BTR, Automotive and many other industries
1C-Polyurethane adhesives (PUR)	High flexibility, perfect strength too, elongation ratio, easy to use, humidity cure	Glass Bonding, General Industry, BTR, Automotive and many other industries
2C-Polyurethane adhesives (PUR)	High flexibility, perfect strength too, elongation ratio, humidity independent cure	Glass Bonding, General Industry, BTR, Automotive and many other industries
No-mix Methyl methacrylate adhesives (MMA)	Snap cure after open time, long pot life due no-mix process	General Industry, Aerospace, BTR, Automotive and many other industries
2C-Methyl methacrylate adhesives (MMA)	Snap cure after open time, very versatile, good adhesion properties without pretreatment	General Industry, Aerospace, BTR, Automotive and many other industries
Phenolic resins & polycondensation adhesives	Very high temperature resistance	Automotive, Brake Bonding
Silicone adhesives & high temperature silicones	Flexible and high temperature resistant, easy to use	General Industry, Aerospace and many other industries
Hybrid adhesives & sealants	Flexible, easy to use, EHS friendly, very wide adhesion properties	General Industry, BTR, Automotive and many other industries
Cyanoacrylate adhesives	Very fast adhesion built up, extremely versatile	General Industry, BTR, Automotive and many other industries
UV-curing adhesives	«On demand» cure possible, very fast cycle times possible	Medical, Glass & PC, PMMA Bonding
Hotmelt adhesives	Very fast cycle times	Electronics, Packaging
Sealants	High flexibility, easy to use	General Industry, BTR, Automotive and many other industries
Anaerobic adhesives	Unlimited open time on air, only reacts when in contact with reactive surfaces	Threadlocker in every industry
Products for pretreatment & posttreatment	High guarantee of bonding quality	Should be checked in every bonding process

Do you need support in selecting a suitable product for your application? Please contact our technical consultants for detailed product information, samples and process advice. We will be pleased to support you.

Designing strong bonds

Loading of adhesive joints – The strength of an adhesive bonding strongly depends on the direction and distribution of the stresses formed in the joint as a result of the loads applied to it. Typical forces are illustrated below. In practice, a bonded structure has to simultaneously sustain a combination of forces.



Strong bonded joints need to be designed that the loading stresses will be directed along the lines of the adhesive's greatest strengths. A poorly designed joint can lead to high-stress concentrations in the joint itself and/or in the substrates connected. Adhesives are more resilient under shear, compression and tension stresses. Cleavage and peel loading are the most severe as they concentrate the applied force into a single line of high stress.

Surface preparation and pretreatment are decisive factors for the strength and fatigue performance of an adhesive bond. In order to ensure an optimum wetting on the substrate, a thorough surface preparation is required to remove contaminations, offer a clean surface and increase the bonding area and surface energy of the substrate. Common surface preparation methods are degreasing, abrading and special pretreatments. BODO MÖLLER CHEMIE offers a wide range of cleaners and surface technologies to provide adhesive joints an optimum strength and reliability.

Degreasing

The removal of oil or greases residues from the surface is essential but should be combined to other surface preparation like mechanical abrasion followed by loose particle removal or chemical pretreatment for optimizing the bonding.

Degreasing methods: Vapor degreasing, solvent immersion, brush or wipe with degreasing agent, detergent degreasing, alkaline degreasing, ultrasonic degreasing

Abrading

Lightly abraded surfaces provide better anchoring to adhesives than highly polished surfaces. After abrading the surface further treatment methods are required to ensure complete loose particles removal, like degreasing operation, lightly brushing with a clean soft brush or vacuum cleaning.

Abrading methods: Grit blasting, wire brush, abrasive cloth, abrasive paper

Special pretreatments

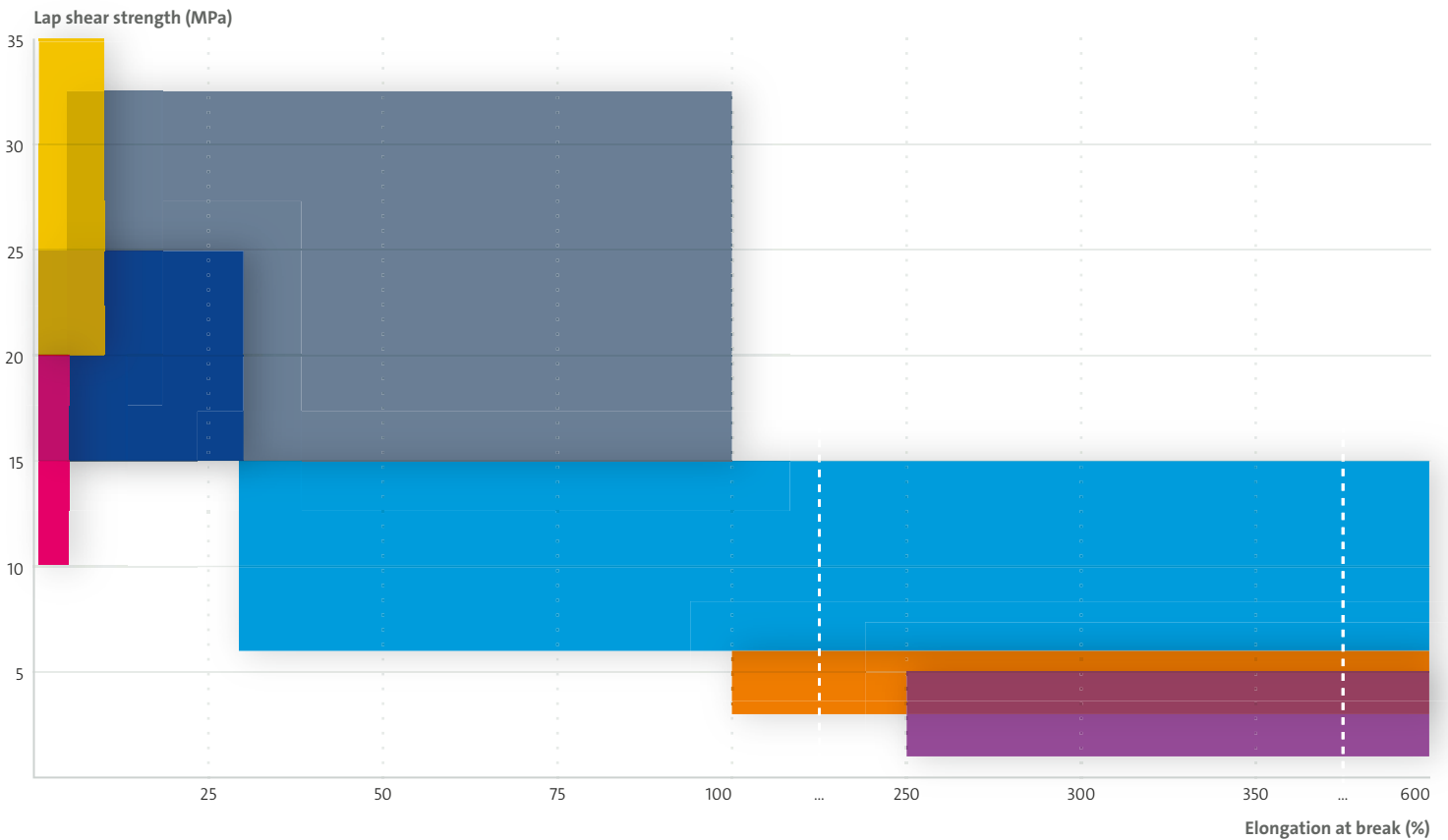
Degreasing and abrading methods are sufficient for most adhesive joints. In order to obtain maximum strength, reproducibility and long-term resistance to deterioration, a chemical or electrolytic pretreatment may be required.

Metal: Acid etching, anodising, primer applications

Plastics/composites: Low pressure plasma, atmospheric plasma, corona treatment, flame treatment



Shear strength and elongation at break comparison



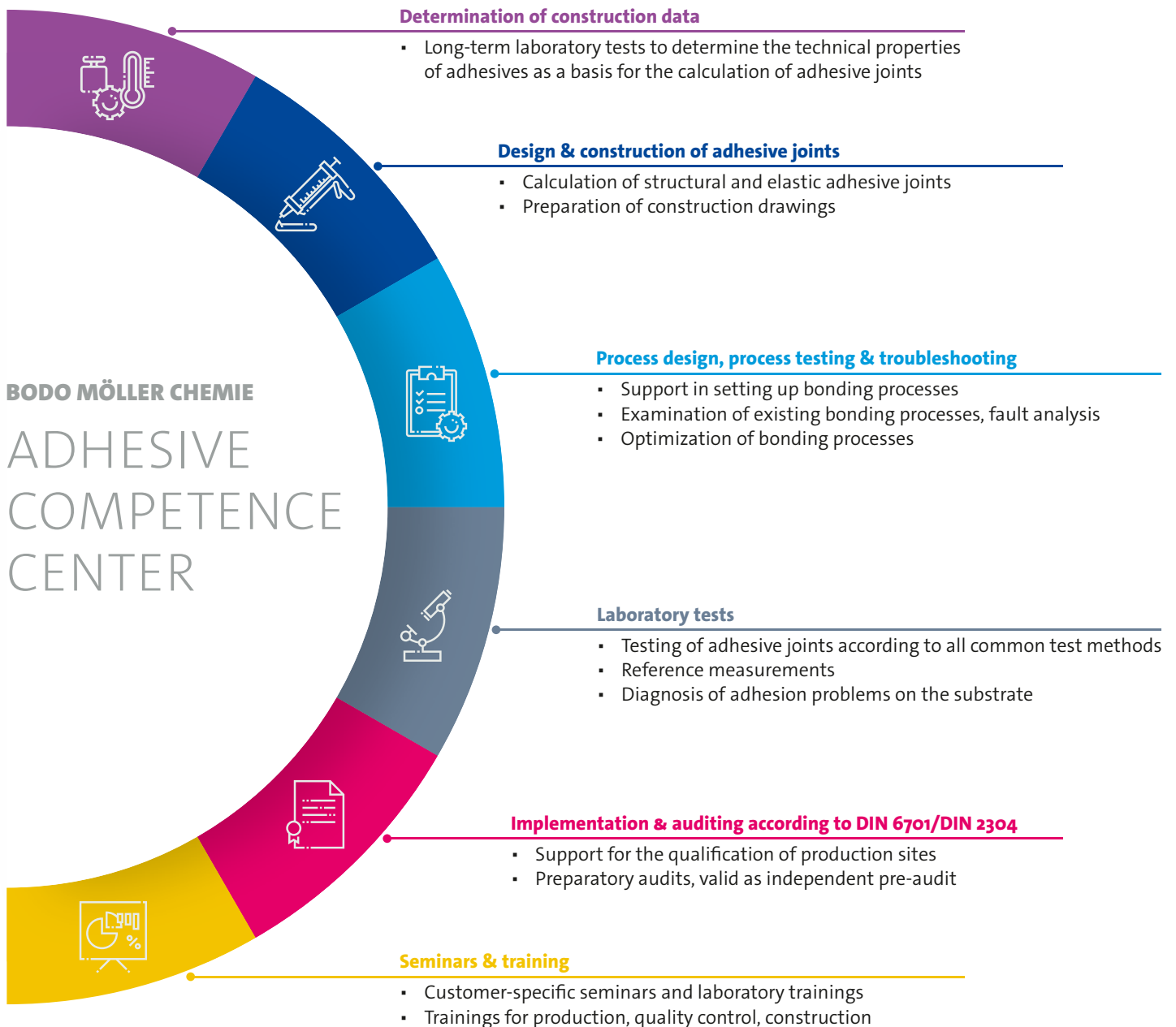
- Epoxy resin adhesives 20–35 MPa / 1–10%
- Phenolic resins & polycondensation adhesives 10–20 MPa / 1–5%
- Cyanoacrylate adhesives 15–25 MPa / 1–30%
- Methyl methacrylate adhesives 15–33 MPa / 5–100%
- Polyurethane adhesives 6–15 MPa / 30–600%
- Hybrid adhesives & sealants 3–6 MPa / 100–600%
- Silicone adhesive & high temperatur silicones 1–5 MPa / 250–600%

The specialists of our **Adhesive Competence Center** support customers in the design and construction of adhesive joints with extensive product and application know-how, FEM calculation and application tests in our Adhesive Laboratory.

Application technology center

With our **Adhesive Competence Center**, we offer full service in all matters related to adhesive application technology – from product selection all the way to product validation, process simulation and engineering data.

The Adhesive Competence Center is certified for the designing of bonding joints according to DIN 2304 S1 and DIN 6701-2 A1 and our Adhesive Laboratory has a Competence Approval for DIN 2304 S1 and DIN 6701-2 A1. All measurements are carried out in accordance with international DIN, EN and ISO standards.





QUALITY & SAFETY

ISO 9001 Quality management**ISO 14001** Environmental management**ISO 45001** Occupational health & safety**EN 9120** Distribution and repacking for aviation industry**DIN 6701** Adhesive bonding of railway vehicles (laboratory)**DIN 2304** Quality requirements for adhesive bonding processes (laboratory)

AN EXCERPT OF OUR LONGTIME PARTNERS



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State 08/2020

Regional offices

BODO MÖLLER CHEMIE



GERMANY

Bodo Möller Chemie GmbH

Headquarters
Offenbach a. M.
Phone +49 69 838326-0
info@bm-chemie.de

AUSTRIA / SLOVENIA

Bodo Möller Chemie Austria GmbH

Korneuburg (Austria)
Phone +43 2262 61998
info@bm-chemie.at

SWITZERLAND

Bodo Möller Chemie Schweiz AG

Winterthur
Phone +41 52 2031930
info@bm-chemie.ch

FRANCE

Bodo Möller Chemie France SAS

Sales Office Ruaudin
Phone +33 243 240429
bureau@bm-chemie.fr

Sales Office Lyon

Phone +33 478 982337
bureau lyon@bm-chemie.fr

BENELUX

Bodo Möller Chemie Benelux N.V.

Antwerpen (Belgium)
Phone +32 3 2352135
info@bm-chemie.be

UNITED KINGDOM / IRELAND

Bodo Möller Chemie UK Ltd.

Winsford
Phone +44 1606 532115
info@bm-chemie.co.uk

DENMARK

Bodo Möller Chemie Denmark Aps

Stenløse
Phone +45 48 163470
info@bm-chemie.dk

SWEDEN / NORWAY

Bodo Möller Chemie Sweden AB

Källered (Sweden)
Phone +46 31 698952
info@bm-chemie.se

FINLAND / ESTONIA

Bodo Möller Chemie Finland Oy

Helsinki (Finland)
Phone +358 9 6829010
info@bm-chemie.fi

POLAND / LITHUANIA / LATVIA

Bodo Möller Chemie Polska Sp. z o.o.

Suchy Las (Poland)
Phone +48 61 8220975
info@bm-chemie.pl

Adhesive Competence Center & Laboratory

Poznań (Poland)
Phone +48 61 6272143
info@bm-chemie.pl

CZECH REPUBLIC / SLOVAKIA

Bodo Möller Chemie Czech & Slovakia, s.r.o.

Sales Office Bratislava (Slovakia)
Phone +421 2 33006732
info@bm-chemie.sk

Sales Office Prague (Czech Republic)

Phone +420 239 045301
info@bm-chemie.cz

HUNGARY

Bodo Möller Chemie Hungary Kft.

Tatabánya
Phone +36 34 782019
info@bm-chemie.hu

CROATIA

Bodo Möller Chemie Austria GmbH

Podružnica Zagreb
Phone +385 91 2620276
info@bm-chemie.at

RUSSIA

Bodo Möller Chemie Russia LLC

Moscow
Phone +7 495 9885850
info@bm-chemie.ru

INDIA

Bodo Moeller Chemie India Pvt. Ltd.

Mumbai
Phone +91 22 49741848
info@bm-chemie.in

CHINA

Bodo Moeller Chemie (Shanghai) Co., Ltd.

Shanghai (P.R. China)
Phone +86 21 64750182
info@bm-chemie.cn

Bodo Moeller Chemie Hong Kong Ltd.

Hong Kong
Phone +86 21 64750182
info@bm-chemie.hk

ISRAEL

BM Chemie Israel Ltd.

Tel Aviv
Phone +972 77 6935501
info@bm-chemie.co.il

MIDDLE EAST

Bodo Möller Chemie Middle East FZE

Dubai (UAE)
Phone +971 4 8813833
info@bm-chemie.ae

EGYPT

Bodo Moeller Chemie Egypt SAE

Bodo Moeller Chemie Egypt Import Ltd.

Sales Office Cairo
Phone +20 2 226963-91 / -92 / -93
info@bm-chemie.com.eg

Bodo Moeller Chemie Egypt SAE

Sales Office Alexandria
Phone +20 3 3922061 / +20 3 3903210
info@bm-chemie.com.eg

Production Plant Sadat City

Phone +20 4 82656041
info@bm-chemie.com.eg

MOROCCO

Bodo Moeller Chemie Morocco SARL AU

Casablanca
Phone +212 522 262732
info@bm-chemie.ma

KENYA

Bodo Moeller Chemie Kenya Ltd.

Nairobi
Phone +254 723 592566
info@bm-chemie.co.za

SOUTH AFRICA / SUB-SAHARA REGION

Bodo Möller Chemie South Africa (PTY) Ltd.

Sales Office Port Elizabeth
Phone +27 41 3641335
info@bm-chemie.co.za

Sales Office Johannesburg

Phone + 27 114 501745
info@bm-chemie.co.za

USA

Bodo Moeller Chemie Corp.

Duluth, Georgia
Phone +1 770 2952288
info-us@bm-chemie.com

MEXICO

Bodo Möller Chemie México, S. de R.L. de C.V.

Puebla
Phone +52 222 2405168
info@bm-chemie.mx