

***Bilgram***  ***Chemie***



**Product Range Adhesives**

### **Bilgram Chemie - Trade and production since 1971**

The company was founded at the beginning of the 70s. Hugo Bilgram sen. initially sold and distributed salt from the location in Ostrach, whether as road salt or for the textile industry on the Swabian Alb. It was not until 1988 that the range was expanded to include industrial chemicals. Today the company Bilgram Chemie sells mainly inorganic and organic chemicals from hydrochloric acid to defoamers, a wide range of salts and own products such as car care products, but also adhesives and swimming pool chemicals.

Our main location in Ostrach in southern Germany is one of a total of five located in the south and middle of Germany. We trade in solid and liquid chemicals, produce our own brands and are active in contract manufacturing and contract filling. With approx. 250 employees, a total area of 150 000 m<sup>2</sup> and over 40 owned trucks we are always strive to supply our customers quickly and on time.

*Ostrach, Mai 2019*



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### Adhesion und Cohesion

Adhesion: Bonding mechanism between two interfaces.

Cohesion: Bonding within a material  
= interior stability.

### Structural robustness dry/wet

Maximal capacity to withstand mechanical stress.

### Solid matter

Remaining mass after drying  
= water- and solventfree content adhesive.

### Storage stability

Durability of adhesive.

### Mechanical flow behaviour

Change of viscosity with mechanical stress.

### Open time

Interval between application and adding together of the adherends.

### pH-value

Acid (pH <7), neutral (pH = 7) and alkaline (pH >7)  
characters of an adhesive, influences properties like  
storage stability, stability of pipes etc.

### Brushability

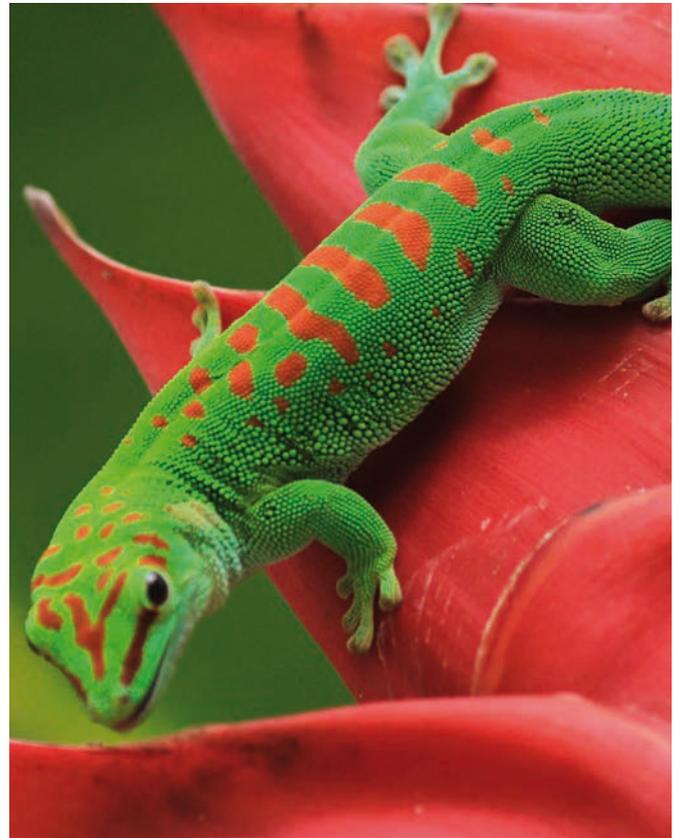
Characteristic of processability.

### Pot life

Interval between the blending of a polyblend adhesive  
and the end of its processability.

### Behaviour of drying

Properties about the way and time of drying of the mobile phase (solvents like water and additives).



### Discoloration

Unwanted discoloration through interaction between adhesive and wood ingredients.

### Viscosity

Flow behaviour; basic characteristic for processing, flowing, film boiling and storage stability. All stated viscosity values are measured according to Brookfield +23 °C / 20 rpm.

### Heat resistance (WATT 91)

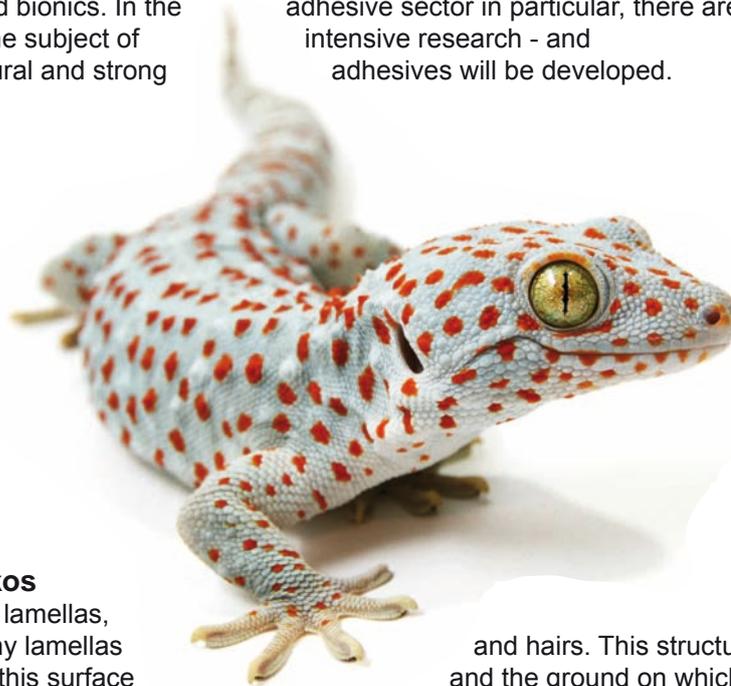
Mechanical stability of adhesive at 80 °C.

### White point

= minimum film forming temperature (MFT); lowest temperature when dispersions form a coherent film; at this point the dispersion has a white colour.

**Nature as a role model**

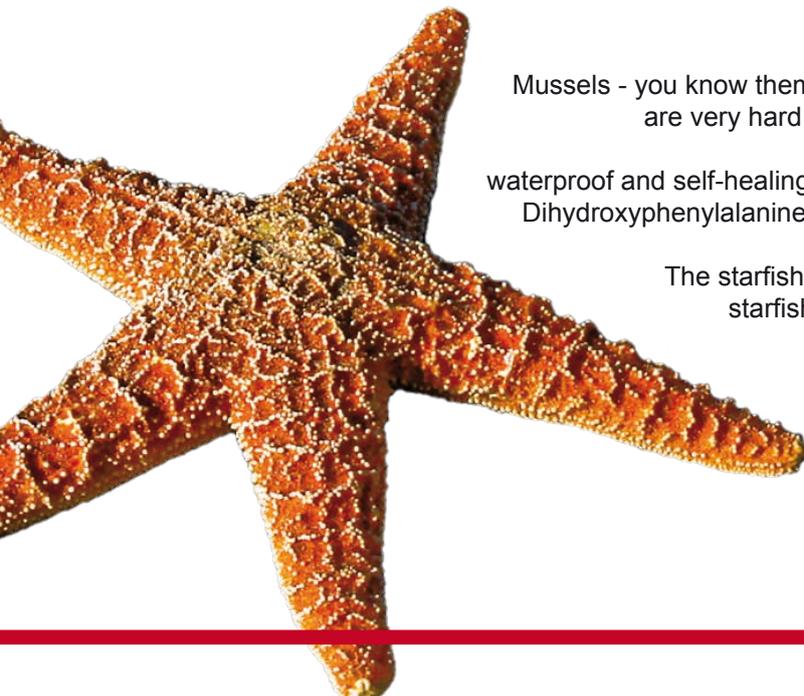
Almost everyone has heard about the Van-der-Waals forces of the geckos, with the help of which the gecko feet can adhere to smooth surfaces. To transfer such ingenious techniques from nature to technology - this is the trend. This principle is called bionics. In the adhesive sector in particular, there are a number of models from nature that are currently the subject of intensive research - and hopefully in the near future natural and strong adhesives will be developed.



**Adhesion force of the geckos**

The feet of the gecko consist of lamellas, which again in turn consist of tiny lamellas an oversized surface. Between this surface moves, physical forces are created by the It is presumed that Van-der-Waals forces and electrostatic forces both play a part. The gecko literally "sticks" to a smooth wall. Only through shearing can these trained forces be released and the gecko can move on.

and hairs. This structure creates and the ground on which the gecko huge surface on the smallest space.



**Adhesive strength from the oceans**

Mussels - you know them from your holidays - stick to stones or wreckage and they are very hard to remove. This glue, which the mussel produces, is a real allrounder: adheres to almost all surfaces, waterproof and self-healing. Certain amino acids are responsible for these properties. Dihydroxyphenylalanine in particular, also known as "DOPA", is responsible for the extremely strong adhesive power.

The starfish also uses one of the strongest adhesives. Nevertheless, a starfish can move on the sea floor. At first it was believed that the starfish adheres with suction cups - however, researchers discovered a very complex interplay of different substances: The marine animals produce a fast adhesive gel, followed by a solvent that removes the adhesion again.

# Adhesives

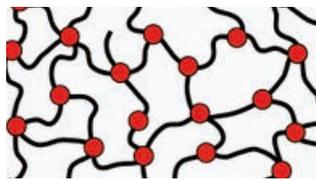
## Adhesive classes

### CLASSIFICATION OF PLASTICS

THERMOPLASTICS	not cross-linked	PE, PP, PVC, cyanoacrylate (super glue), radiation curable adhesives, all physically bonding adhesives like hotmelt adhesives, solvent based wet glues, contact adhesives, dispersion adhesives (D1, D2)
THERMOSETTING POLYMER	extensive cross-linked	epoxid resins, urea-formaldehyde-resins, anaerobic curing adhesives, dispersion adhesives (D3, D4)
ELASTOMER	light cross-linked	silicone, polyurethane adhesives, rubber, natural rubber



Thermoplastics



Thermosetting Polymer



Elastomer

### Classification of adhesives

The classification of adhesives result on different criteria. On the one hand, the adhesives can be classified according to the type of cross-linking of the respective plastic (see above), including thermoplastics, thermosets and elastomers. On the other hand, plastics can also be classified according to their bonding mechanism. There are chemically curing adhesives and physically curing adhesives.

### Chemically curing adhesives

The adhesives cure because of a chemical reaction. This is where many monomers were finally combined to form a polymer. This can be achieved by polyaddition (epoxides and polyurethanes), polycondensation (silicones and modified silane polymers) or polymerization (instant adhesives, methyl methacrylate adhesives, anaerobic curing adhesives and radiation curing adhesives). Two scenarios are possible for the reaction:

- Single-component adhesive: The reaction components are not spatially separated, but are chemically blocked. The reaction is influenced by conditions such as temperature, humidity or UV radiation.
- Two-component adhesive: The reaction components resin and hardener are spatially separated from each other, and react to each other when they are joined together.

### Physically curing adhesives

The adhesive polymer is always present in a container as a one-component adhesive. The adhesive is solidified by physical processes such as evaporation of the solvents. Then the adhesive polymers interact with each other and bond.

### Adhesive precoated materials

For example pressure-activated adhesives such as adhesive tapes.

### Dispersion adhesives

Dispersions are at least two immiscible or only slightly miscible components which are finely distributed and stabilized in one another with emulsifiers and/or polyvinyl alcohols. For example, milk is a dispersion in which fat droplets are dispersed in water.

Adhesives can also be present as dispersions. Here, polymer particles are finely dispersed in solvents such as water. Emulsifiers are usually also used in this system. In the suspended state, the polymer particles cannot develop an adhesive effect. Only when the solvent evaporates through physical drying or is absorbed by the parts to be joined, the polymer particles come into contact with each other and gradually link with each other.

The color of the dispersion adhesive changes from white to transparent - the white point. A minimum temperature is required for this process, this temperature is called the minimum film forming temperature.

#### ADHESIVE CLASSES ACCORDING DIN EN 204 (FOR WOOD)

D1	FOR INDOOR USE	low air humidity, temp. more than 50 °C for a short time, humidity of wood max. 15 %	Furniture, interior fixtures, room doors, dry rooms "dry strength"
D2	FOR INDOOR USE	sporadic high air humidity, humidity of wood max. 18 %	Furniture, interior fixtures, room doors in kitchen and bathrooms, humid rooms without wet areas "humid strength"
D3	FOR INDOOR AND OUTDOOR USE	high air humidity, contact with water for a short time	Fixtures in wet rooms, doors and windows protected from weather "cold water strength"
D4	FOR INDOOR AND OUTDOOR USE	frequent contact with water for a long time	Outdoor areas, doors (not protected from weather), windows with surface protection "cooking water strength"

### Dispersion adhesives - adhesives classes according DIN EN 204 (wood)

Several thousand years ago people had the idea to connect materials and attach objects to each other, e.g. arrows had to be provided with feathers. These early aqueous adhesives were made of animal skins, animal bones and plants. At the beginning and middle of the 20th century this technology was replaced by dispersion glues based on polyvinyl acetate (PVAc). These glues are mainly used for gluing wood materials. DIN EN 204 classifies thermoplastic wood adhesives according to their water resistance in strain groups D1 to D4. The table above shows the classification.



# Adhesives

## Wood

Product	Form	Class	Open time 20 °C	Pressing time <i>approx.</i>	pH <i>approx.</i>
<b>STRAIN GROUP D2</b>					
Miracol® 13F2 Express	white dispersion	PVAc	++	5 - 30 min at 20 °C 1,5 - 2 min at 80 °C	7,5
Miracol® 6092	white dispersion	PVAc	+++	15 min at 20 °C 4 min at 70 °C	5,0 - 6,5
Miracol® 6132	white dispersion	PVAc	++	15 min at 20 °C 3 min at 70 °C	6,5
Miracol® 6214	white dispersion, thixiotrope	PVAc	++	n. i.	4
Miracol® 6260	white dispersion, cured yellowish hazy film	PVAc	++	15 at 20 °C 35 s at 100 °C	4,5
Miracol® 6262	white dispersion, cured yellowish hazy film	PVAc	+++	50 s at 100 °C	4,5

Viscosity <i>approx.</i>	Solid content 105 °C <i>approx.</i>	Dedicated Norm	Application
11000 mPas	47 %	EN 204 - D2	Particularly fast wood glue with long open time and short pressing time. For all common types of wood and wood-based materials. Suitable for assembly gluing. Suitable for high frequency.
11000 mPas	53 %	EN 204 - D2	Dispersion adhesive with very long open time. For general bonding in the wood industry.
12000 mPas	50 %	EN 204 - D2	Wood glue, which corresponds to the requirements of DIN EN 71-3 for children's toys and food packaging.
24000 mPas	53 %	EN 204 - D2	Thixotropic wood glue with long open time and short pressing time. For all common types of wood and wood-based materials as well as laminates and wood-laying boards. Suitable for assembly gluing.
11000 mPas	55 %	EN 204 - D2 veneer splicing glue	Dispersion adhesive, fast setting, hot curing. For demanding veneer work and general laminate bonding such as CPL/HPL and films on wood-based materials in furniture and interior construction. Very short setting times for warm and hot gluing. Hard, but not brittle glue film; prevents joint openings. Thanks to high solid content virtually puncture-proof for problematic veneers.
12000 mPas	50 %	EN 204 - D2 veneer splicing glue	Corresponds to Miracol® 6260 with double open time.

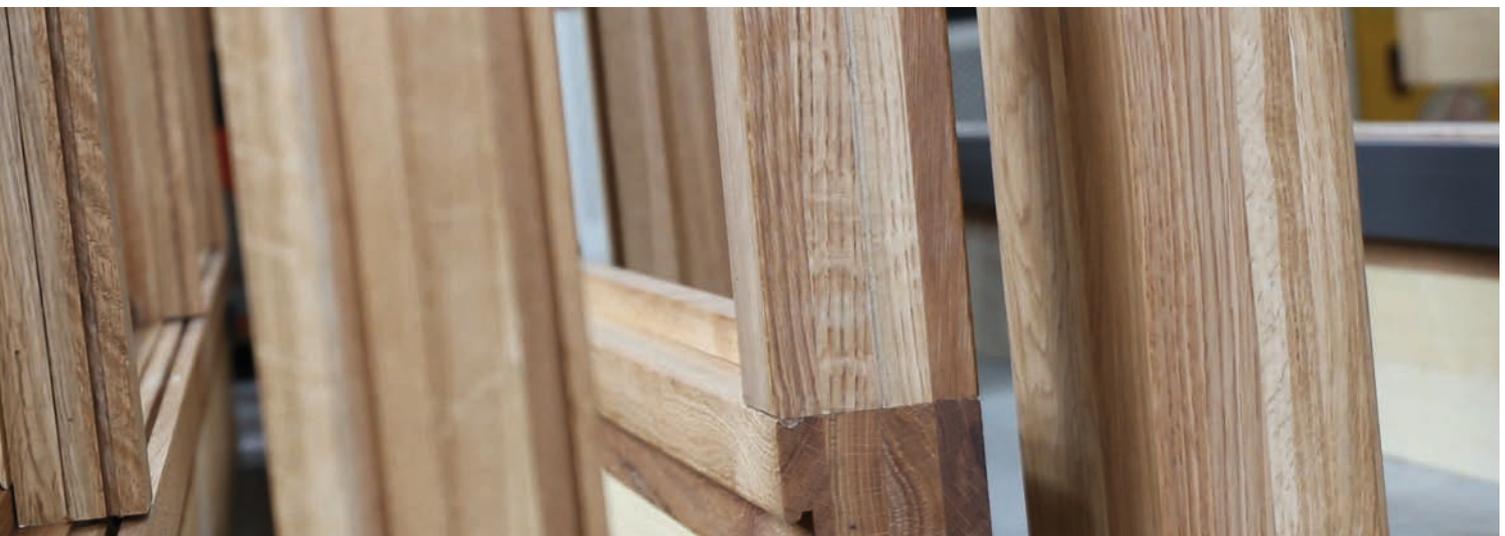
# Adhesives

## Wood

Product	Form	Class	Open time 20 °C	Pressing time <i>approx.</i>	pH
<b>STRAIN GROUP D3</b>					
Miracol® 6359	white dispersion	PVAc	++	12 min at 20 °C 25 s at 110 °C	5
Miracol® 6360 Universal	white dispersion	PVAc	++	10 min at 20 °C 1,5 - 2 min at 80 °C	5
Miracol® 6368	white dispersion, foamable	PVAc	n. i.	n. i.	5
<b>STRAIN GROUP D3 / D4 WITH HARDENER</b>					
Miracol® 6274	white dispersion	PVAc	++	10 min at 20 °C 1,5 - 2 min at + 80 °C	3
Miracol® 6285 Alu	white dispersion	PVAc	++	10 - 60 min at 20 °C	3



Viscosity <i>approx.</i>	Solid content 105 °C <i>approx.</i>	Dedicated Norm	Application
10000 mPas	53 %	EN 204 - D3	Dispersion adhesive, fast setting, hot curing. For demanding veneer work and general laminate bonding such as CPL/HPL and films on wood-based materials in furniture and interior construction. Very short setting times for warm and hot gluing. Hard, but not brittle glue film; prevents joint openings. Thanks to high solid content virtually puncture-proof for problematic veneers.
8000 mPas	47 %	EN 204 - D3	Universally applicable wood glue with increased moisture resistance D3. For all common types of wood and wood-based materials. Suitable for assembly gluing. For indoor applications. Suitable for high frequency.
6000 mPas	48 %	EN 204 - D3	Foamable dispersion adhesive for doubling insulation elements based on wood and hemp fibre boards. The foam is extremely stable and also suitable for ring pipes. High initial adhesion, fast drying.
2500 mPas	46 %	EN 204 - D3 with hardener EN204 - D4	Dispersion adhesive D3 (with hardener D4) for window construction (window and protected facade parts). For general bondings in the wood industry with increased moisture stress. Suitable for high frequency. Complies with FFF-FKS-EMPA guideline 08.03/2013 for corner joints, with Miracol® Hardener 9504 for lamination and finger jointing.
7000 mPas	48 %	EN 204 - D3 with hardener EN204 - D4	Dispersion adhesive for wood-aluminium composites. For coating wood-based materials with aluminium, lead, brass (CuZn37), copper and galvanised steel (Zincor® DE01+ZE). Not suitable for stainless steel (St 37-2).



# Adhesives

## Wood

Product	Form	Class	Open time 20 °C	Pressing time <i>approx.</i>	pH <i>approx.</i>
<b>STRAIN GROUP D4</b>					
Miracol® 6254	white dispersion	PVAc	+	10 min at 20 °C 1,5 - 2 min at 80 °C	3
Miracol® 6255	white dispersion	PVAc	+	10 min at 20 °C 1,5 - 2 min at 80 °C	3
Miracol® 6257	white dispersion	PVAc	+	40 - 240 s at 20 °C with hardener Miracol® 9524	3
Bilo-Col 1KD4 G	white dispersion	PVAc	++	10 min at 20 °C 1,5 - 2 min at 80 °C	3
Bilo-Col 1KD4 U	white dispersion	PVAc	+	12 min at 20 °C 3-5 min at 80 °C	3



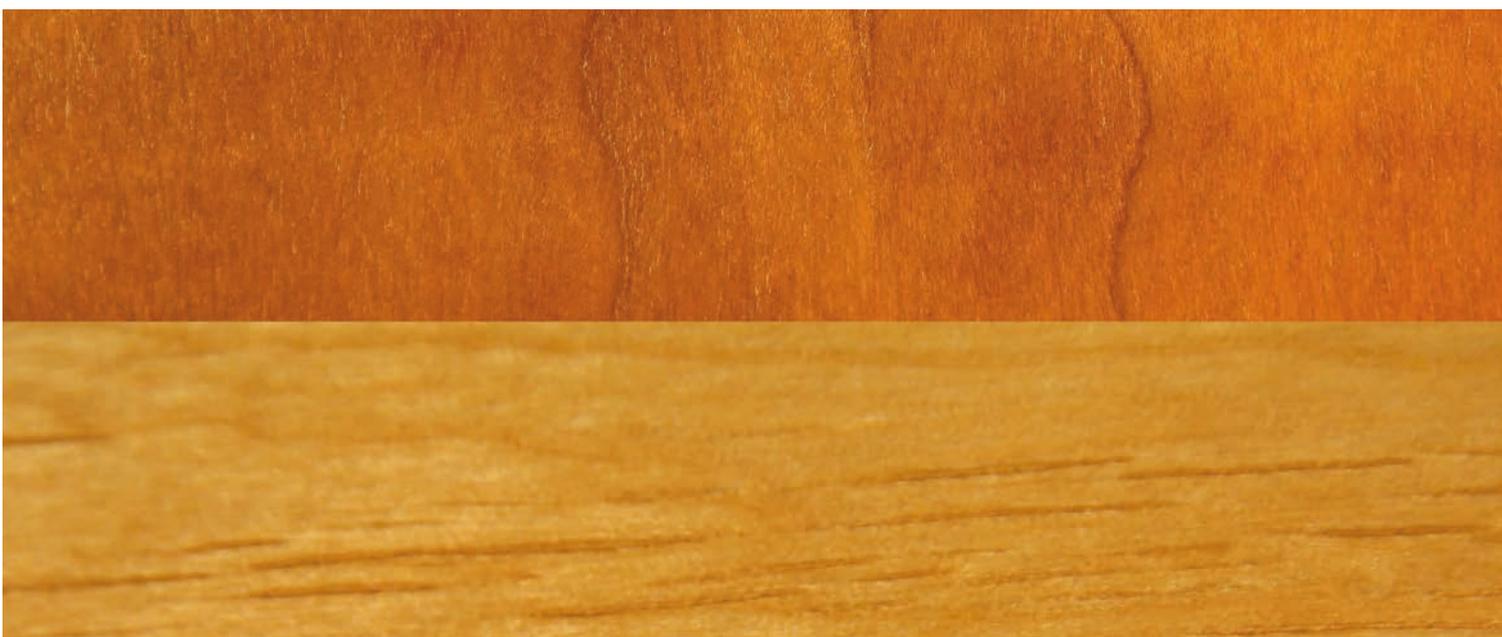
Viscosity <i>approx.</i>	Solid content 105 °C <i>approx.</i>	Dedicated Norm	Application
12000 mPas	48 %	EN204 - D4	1K D4 dispersion adhesive (1-component) with increased viscosity. For window and protected facade parts. For general bonding in the wood industry with increased moisture exposure. Suitable for high frequency. Fulfils FFF-FKS-EMPA guideline 08.03/2013. Complies with EN 204-D4 and WATT 91 (> 7 N/mm <sup>2</sup> ) without addition of hardener.
6500 mPas	49 %	EN204 - D4	1K D4 dispersion adhesive (1-component) for window and protected facade parts. For general bonding in the wood industry with increased moisture exposure. Suitable for high frequency. Fulfils FFF-FKS-EMPA guideline 08.03/2013. Complies with EN 204-D4 and WATT 91 (> 7 N/mm <sup>2</sup> ) without addition of hardener.
2500 mPas	51 %	EN204 - D4 with hardener Miracol® 9524	Extremely fast 2K D4 dispersion adhesive (2-component) for window and protected facade parts. For general bonding in the woodworking industry with increased moisture stress. Suitable for high frequency. Complies with FFF-FKS-EMPA directive 08.03/2013. Can be processed further immediately after bonding. Also suitable for painted surfaces.
10500 mPas	50 %	EN204 - D4	1K D4 dispersion adhesive (1 component), filled, for gluing at high temperatures humidity and temperature fluctuations. Can also be used with products which are exposed to the weather. Longer shelf life than Miracol® 6254 / 6255. Also suitable for bonding certain metals to wood. Complies with EN 204-D4 and WATT 91 (> 7 N/mm <sup>2</sup> ) without addition of hardener.
8500 mPas	47 %	EN204 - D4	1K D4 dispersion adhesive (1 component) for gluing at high humidity and temperature fluctuations. Also suitable for products exposed to the weather. Longer shelf life than Miracol® 6254 / 6255. Also suitable for bonding certain metals to wood. Complies with EN 204-D4 and WATT 91 (> 7 N/mm <sup>2</sup> ) without addition of hardener.



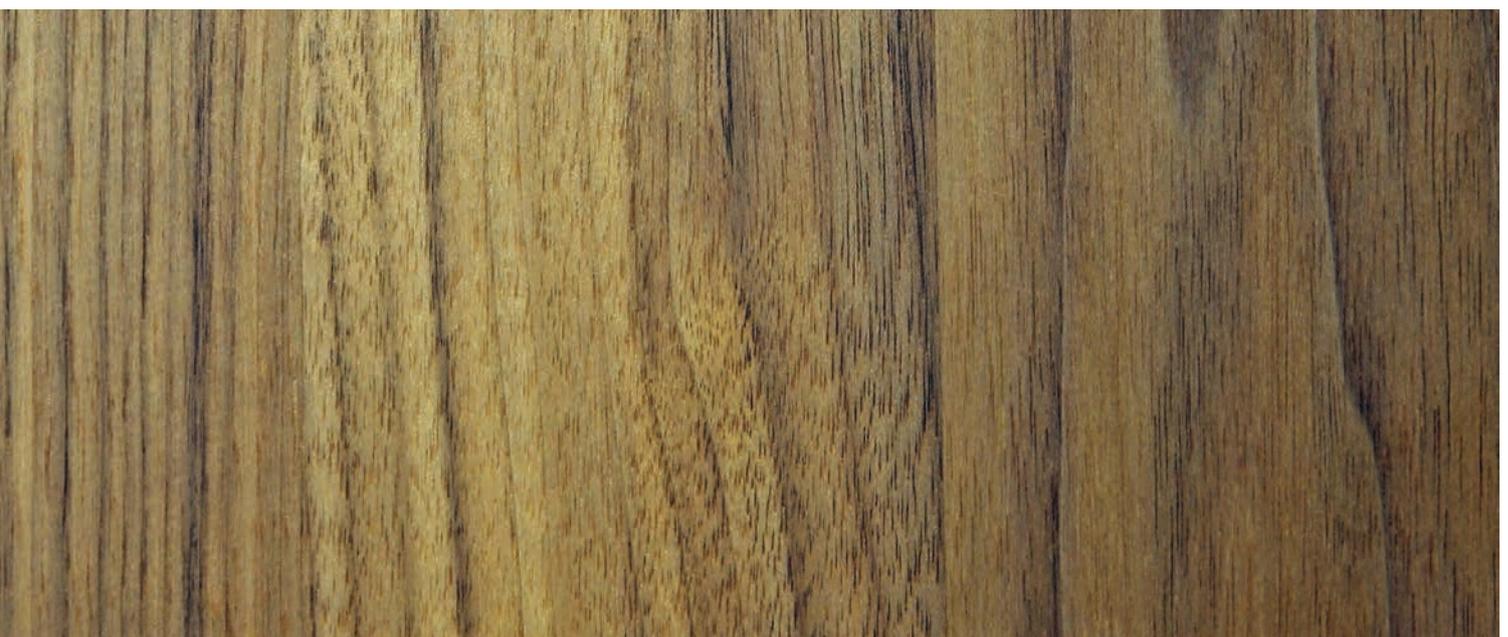
# Adhesives

## Wood

Product	Form	Class	Open time 20 °C <i>approx.</i>	Pressing time <i>approx.</i>	pH <i>approx.</i>
<b>POWDER ADHESIVES</b>					
Miracol® S550	white dispersion	PVAc	++	n. a.	7
Miracol® U/F 4515	powder	urea-formaldehyde- condensation product	pot life 8 h at 20 °C	min. 9 min at 70 °C min. 2 min. at 110 °C	n. a.
Miracol® U/F 4520	powder	urea-formaldehyde- condensation product	pot life 8 h at 20 °C	0,8 - 1,2 s at 180 - 220 °C	n. a.
GIRAL Furnierfugenleim 18/3	powder	urea-formaldehyde- condensation product	pot life 7 h at 20 °C	0,8 - 1,2 s at 180 - 220 °C	6 (65%)
GIRAL Furnierfugenleim 10/23	powder	urea-formaldehyde- condensation product	pot life 3 h at 20 °C	0,8 - 1,2 s at 180 - 220 °C	5 (65%)
<b>RESIN SOLUTIONS</b>					
Miracol® U/F U 102	cloudy liquid	urea-formaldehyde- condensation product	depending on the choice of hardener	gel time: 22 - 24 s at 100 °C with 10 % Miracol® S 10	8
Miracol® U/F U 103	cloudy liquid	urea-formaldehyde- condensation product	depending on the choice of hardener	gel time: 22 s at 100 °C with 10 % Miracol® S 10	8
Miracol® U/F U 200	cloudy liquid	urea-formaldehyde- condensation product	depending on the choice of hardener	gel time: 28 - 30 s at 100 °C with 10 % Miracol® S 10	8
Miracol® U/F U 310	cloudy liquid	urea-formaldehyde- condensation product	depending on the choice of hardener	gel time: 50 s at 100 °C with 10 % Miracol® S 10	8



Viscosity <i>approx.</i>	Solid content 105 °C <i>approx.</i>	Application
13000 mPas	51 %	Especially for the modification of urea-formaldehyde adhesives: Increase of elasticity and improvement of adhesion on non-polar materials.
n. i.	56 - 59 %	Wood glue for general bonding in the wood industry. Coating of laminate press boards with wood-based materials, veneering of wood-based materials, gluing of joints, etc.
2000 - 3500 mPas depending on mixture	62 - 64 %	Joint veneer adhesive with long pot life, extremely short gel time and gentle on tools due to the formation of a special protective film.
2500 - 3000 mPas (65%)	64 - 68 %	Joint veneer adhesive with long pot life, extremely short gel time and gentle on tools due to the formation of a special protective film.
2500 - 3000 mPas (65%)	64 - 68 %	Joint veneer adhesive with long pot life, extremely short gel time and gentle on tools due to the formation of a special protective film.
1200 mPas	67 %	Wood glue for cold, warm and hot gluing in the plywood, door and furniture industry. Very long shelf life and very short pressing times.
1000 mPas	65 %	Wood glue for cold, warm and hot gluing in the plywood, door, furniture and parquet industries.
900 mPas	67 %	Wood glue for cold, warm and hot gluing in the plywood, door, furniture and parquet industries and especially for short pressing times.
800 mPas	67 %	Wood glue for cold, warm and hot gluing in the plywood, door, furniture and parquet industries. Particularly suitable for hot gluing at 70 - 140 °C.



# Adhesives

## Paper

Product	Form	Class	pH <i>approx.</i>	Viscosity <i>approx.</i>	Solid content 105 °C <i>approx.</i>
<b>PAPER- AND LAMINATION ADHESIVES FOR PAPER AND CARDBOARDS</b>					
Miracol® 5615	colourless, liquid	polyvinyl alcohol	6	1700 mPas	12 %
Miracol® 6011	white dispersion	PVAc	4,5	1100 mPas	50 %
Miracol® 6013	white dispersion	PVAc	7	5700 mPas	48 %
Miracol® 6025	white dispersion	PVAc	4,5	1800 mPas	55 %
Miracol® 6029	white dispersion	PVAc	4,5	2200 mPas	48 %
Miracol® 6225	white dispersion	PVAc	3,5	950 mPas	53 %
Miracol® 6273	white dispersion	PVAc	3	1500 mPas	48 %
Miracol® 6599	white dispersion	PVAc	4	25000 mPas	57 %
Miracol® 6810	white dispersion	PVAc	5	1200 mPas	50 %
Miracol® DW 1.5	liquid	VAE (ethylen- polyvinylacetate dispersion)	4,5	1500 mPas	55 %
Miracol® DW 2.5	liquid	VAE (ethylen- polyvinylacetate dispersion)	4,5	2500 mPas	55 %

Paper and Lamination Adhesives

FDA / BfR	System	Flatness	Filler	Softener	Application
✓	roller	+++	-	-	Colourless paper glue for paper, cardboard, felt etc.
✓	roller	+	-	✓	Thixotropic laminating glue for cardboard, corrugated cardboard and microwave cardboard.
✓	roller	+	✓	✓	Paper adhesive for general bonding work, block bonding, ceiling production, laminating, facing and side gluing. As reinforcement of paste mixtures. Not suitable for laminated, printed and lacquered surfaces. Hardness gets increased.
✓	roller	+++	-	✓	Laminating glue for paper, cardboard, corrugated cardboard and microwave cardboard. Very good flatness and long open time.
✓	roller	+	-	✓	Dispersion adhesive for the production of folding boxes, box trays and sleeves.
✓	roller	++	-	✓	Low viscosity laminating glue for cardboard, corrugated cardboard and microwave cardboard. Good flatness and very long open time.
✓	roller	+	-	✓	Elastic dispersion adhesive for the production of folding boxes, boxes, trays. Bondings of grey cardboard - grey cardboard are resistant to steam sterilisation. Moisture resistant according to test method FEFCO No. 9.
✓	roller	+	-	-	Dispersion adhesive for the production of sample books, labelling on difficult surfaces. Good adhesion on plastic.
✓	nozzle	+	-	-	Plasticizer-free dispersion adhesive for the production of folding boxes, boxes and trays. Especially for nozzle processing: No tailing, no dripping. Very good adhesion to varnish.
✓	roller / nozzle	+++	-	-	Dispersion adhesive for the production of folding boxes, boxes and trays. Suitable for painted, unpainted and pre-treated surfaces. For fully lacquered cartons only after prior inspection. Excellent machine suitability (rollers / roller application / electromagnetic valves). No yellowing.
✓	roller / nozzle	+++	-	-	Corresponds to Miracol® DW 1.5 with increased viscosity.

# Adhesives

## Other Products

Product	Form	Class	pH <i>approx.</i>	Viscosity <i>approx.</i>	Solid content 105 °C <i>approx.</i>
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### SPECIAL PRODUCTS

Miracol® Reaktiv	liquid	waterbased vinyl acetate dispersion	3	10000 mPas	53 %
Additiv 005.004	liquid	fatty acid - dispersion	10	50 mPas (200 rpm)	38 %

Product	Form	Class	Solvent	Pot Life <i>approx.</i>	pH <i>approx.</i>
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### HARDENER FOR DISPERSION ADHESIVES

Miracol® Härter 9504	liquid	polyisocyanate	-	8 h	n. a.
Miracol® Härter 9518	liquid	polyisocyanate and xylol	✓	8 h	n. a.
Miracol® Härter 9524	blue, liquid	salt solution	-	10 d	n. a.

### SALT HARDENER FOR UREA-FORMALDEHYDE-RESINS

Miracol® S 10	white powder	salt hardener	-	++	n. a.
Miracol® S 12	white powder	salt hardener	-	++	n. a.
Miracol® S 15	white powder	salt hardener	-	++	n. a.
Miracol® S 20	white powder	salt hardener	-	++	n. a.
Miracol® S 25	white powder	salt hardener	-	++	n. a.
Miracol® S 26 A	white powder	salt hardener	-	++	n. a.
Miracol® S 27	white powder	salt hardener	-	++	n. a.
GIRAL Flüssighärter 50250	liquid	salt hardener	-	++	n. a.

### Application

NEW: Heat-activatable heat-seal adhesive for plastics / metal / wood etc. of resistance class EN204 - D3, possible with hardener EN204 - D4. No open time, excellent adhesion on aluminium, lead, non-ferrous metals, plastics, paint. No water ingress - thus no swelling / bowling of fibre materials.

Additive for the reduction of abrasiveness on cardboard and paper. Additive 005.004 is applied to the cardboard slurry during the production of cardboard by spray process without overspray specially adapted to the additive. This makes the board more hydrophobic and homogeneous. Further processing (cutting/punching etc.) is considerably facilitated, cutting and punching tools are considerably spared. Tested according to DIN EN 71-3. Biodegradable.

### Application

Hardener and crosslinker for dispersion adhesives.  
Add 5 % hardener to the white glue quantity, then stir homogeneously and repot if necessary.

Hardener and crosslinker for dispersion adhesives. Optimized adhesion on plastics.  
Add 5 % hardener to the white glue quantity, then stir homogeneously and repot if necessary.

Hardener and crosslinker for dispersion adhesives. Optimized adhesion to metal.  
Add 5 % hardener to the white glue quantity, then stir homogeneously and repot if necessary. Recommended for Miracol® 6585 and 6257.

Used after dissolving in water or powder. For cold and hot gluing.

After dissolving in water in combination with our urea resin glues for surface gluing.  
Does not cause wood discoloration, sets quickly and is used in single-daylight and continuous presses.

Special hardener for the cold gluing of urea-formaldehyde and urea melamine-formaldehyde resins with very short spans. It is only suitable for the pre-coating process.  
For industrial applications (door production, plywood gluing) the hardener can be used in the pre-coating process for hot gluing. This means that especially in the case of longer heating times a faster hardening of the inner glue joint is achieved.

Used in a hot process in combination with our urea resin glues for plywood production and surface gluing.  
The hardener sets quickly and is used in single-daylight and continuous presses.  
When mixed with Miracol® U/F U 310, the hardener is suitable for plywood production in multi-daylight presses.

Used in a hot process in combination with our urea resin glues for plywood production and surface gluing.  
The hardener sets quickly and is used in single-daylight and continuous presses.  
When mixed with Miracol® U/F U 310, the hardener is suitable for plywood production in multi-daylight presses.

Hardener S 26 is used in a hot process in combination with our urea resin glues for plywood production and surface gluing.  
The hardener does not cause wood discoloration, sets normally and is used in single-daylight and continuous presses.  
When Miracol® U/F U 310 is used, the hardener is suitable for plywood production in multi-daylight presses with longer insertion times.

Special hardener for hot gluing of urea-formaldehyde resins with short pressing times.  
The hardener is processed in powder form and is only suitable for the sub-mixing process.  
A high formaldehyde bond is achieved with hardener S 27.

GIRAL Liquid Hardener 50250 is a very fast-acting liquid hardener for processing with liquid urea resin glue in the precoat process.  
It can only be used to a limited extent as a sub-mix hardener.

# 7 steps to perfect adhesive bonding

### 1. The best wood moisture content

During processing, the wood should have the same moisture content as during later use. Measuring instruments are available from approx. 100 €.  
The climate in the workshop should correspond to the desired wood equilibrium humidity. The standard climate is a temperature of 20 °C with a relative humidity of 65 %.  
With a room temperature of 23 °C, this would correspond to an optimum humidity of 50 %.

### 2. The right cut

Side boards must be separated. Cut out the pith tube (= heart) of the core boards.  
The position of the annual rings must be observed at all costs in order to minimize the work of the wood as much as possible.  
Irregular fibre courses, growth-related flaws, knots or felling fractures etc. may lead to stresses in the adhesive joint and have a clearly negative influence on the quality of the bonding.

### 3. The right planing out of the wood

The workpieces must be planed out straight and at an angle.  
Small planing shafts (max. 0.3 mm) as well as tear-free planing of the surfaces to be glued are essential for precise joining. The gluing should be carried out as quickly as possible.



#### 4. The right pre-selection of the bars for the gluing of the boards

Before gluing, the boards are folded according to the annual ring layer. The following must be observed that heartwood must be glued to heartwood and sapwood to sapwood.

In the so-called "fallen" joint, right and left sides should be glued together alternately. It should be avoided to glue side boards to core boards (no vertical on horizontal annual rings).

For frame gluing (e.g. slot and pin) the pin size should not exceed 8 x 8 cm.

#### 5. The correct application of the adhesive

The selected adhesive should be tempered ready for use. The application can be carried out with a glue spatula, glue roller, brush, glue applicator or machine.

The application quantity should follow the recommendations in the technical data sheet and correspond to the open time and cycle time.

A one-sided application is usually sufficient, a two-sided application should be carried out with highly absorbent woods (e.g. spruce, abachi, fir) and highly absorbent surfaces (end grain).

A uniform glue application is a prerequisite for good gluing and optimal dimensioned joints.



#### 6. The right press

The workpiece must be pressed within the open time. Pressing power and pressing time must be taken from the technical data sheet. Pressing power and pressing time depend on the type of wood and adhesive used. We recommend extending the pressing time for wood types with a high bulk density, for mould gluing (high stresses) and materials with a low absorbency.

#### 7. Achieving the final strength

To achieve the final strength, dispersion adhesives should be reconditioned approx. 7 days after completing the pressing process.

Reconditioning is the time the wood takes to absorb the moisture from the glued joint and to release it into the environment.

At the end of this process, the glued joint is hardened and the wood reaches its output humidity.

# Adhesives

## Trading Units

We can deliver in the following containers

Truck

IBC 650 - 1200 kg

Drum 120 kg

Bag 25 kg

Canister 25 kg

Canister 5 kg

PE-bucket 30 kg

PE-bucket 5 kg

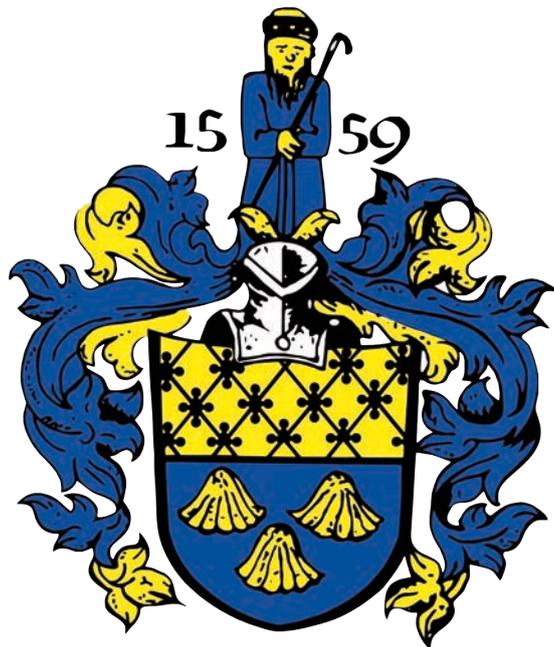
PE-bucket with tap adapter 30 kg

Kaltex-tap for PE-buckets

Kaltex-tap for canister (only possible with suitable adapter)

Kaltex-adapter for canister





***TOGETHER RESOLVING THE  
SOLUTION***

# Die Gruppe The Group



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