Polyurethane-Crosslinkers for Internal Wood Coatings Applications

Rolf Klucker, ramspec - Oct. 4th, 2018

Cross-linkers for Wood Coatings

Waterborne 2-pack PUR Coatings preferred for High Performance Wood Applications

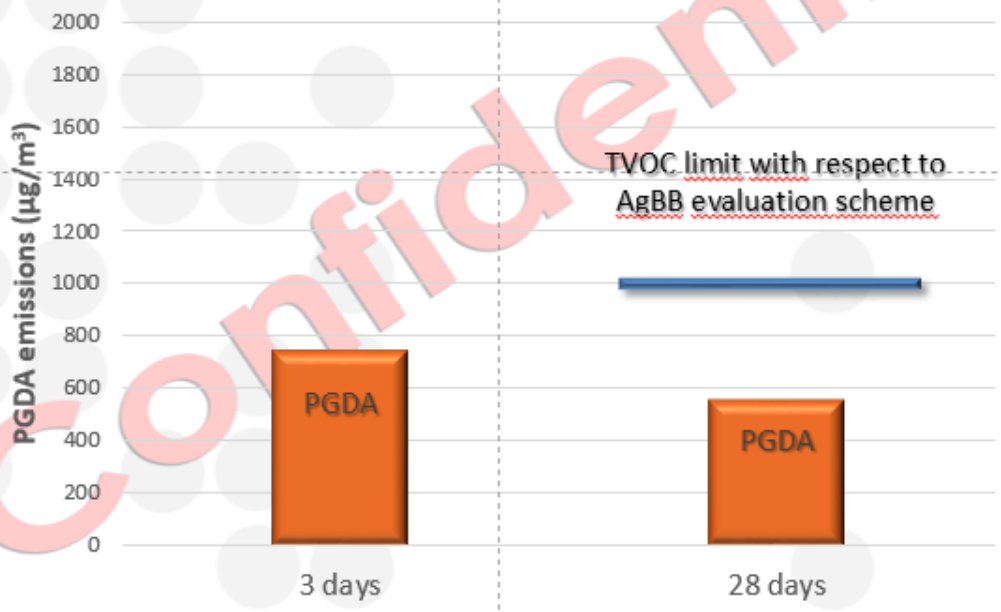
- State of the art:
  - In line with VOC regulations
  - Fast drying and blocking resistance through blends of HDI- and IPDI derivatives
- Room for improvement:
  - Reduced hazardous indoor emissions, in particular with respect to the requirements of the German AgBB-evaluation scheme
  - Improvement of wood warming "Anfeuerung" for waterborne PUR systems compared to solventbornes

Option chosen for improvement: Type of solvent

Cross-linkers for Wood Coatings

PGDA is a low odor solvent, suitable to comply with VOC emission regulations (high LCI-value: 5300 µg/m³)

- The limit of $TVOC_{28} \leq 1000$ µg/m³ in order to comply with the AgBB-scheme can be respected depending on A-part formulation



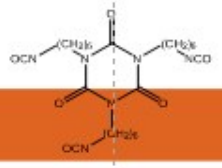
PGDA emission of a 2-pack PUD parquet lacquer formulation, applied in 3 layers of 105 g/m² wet on oak with 24 hours drying between the different layers without sanding, followed by 48h storage under controlled conditions: 23°C at 50% rh.

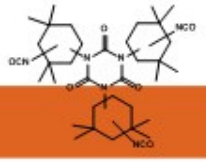
Cross-linker - Application testing

Flooring

Kitchen & office furniture and joinery

- **2-pack parquet lacquer based on Alberdingk® U 9150 (Alberdingk Boley)**
  A/B = 9/1
- **2-pack furniture varnish based on Setaqua™ 6522/6516 (Allnex)**
  NCO/OH =1,3



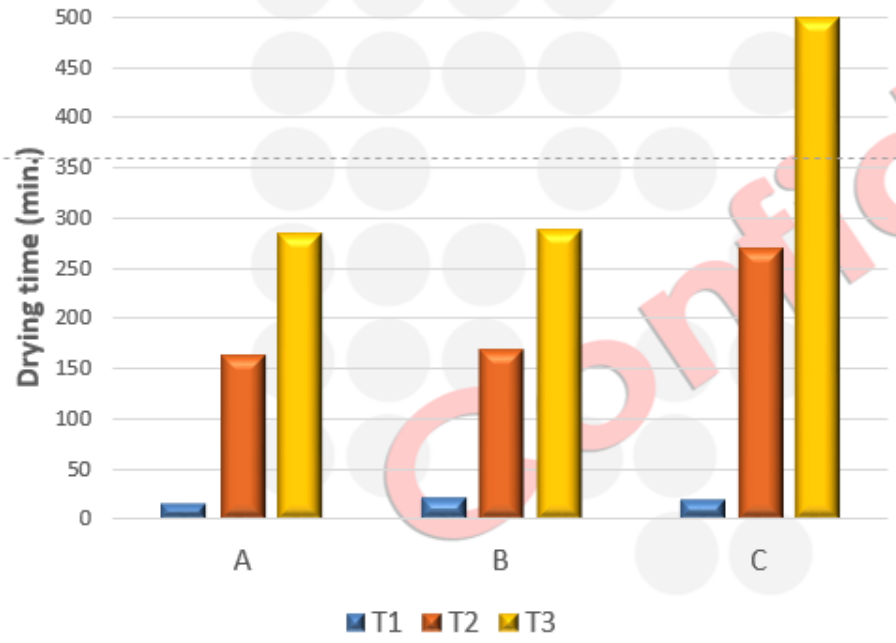


	Hardener type	Solvent	Solids
A	Hydrophilic hybrid hardener based on HDI- and IPDI- derivatives	PGDA	69%
B	Hydrophilic hybrid hardener, similar to A	Butoxyl	69%
C	Standard HDI-based hydrophilic hardener	PGDA	70%

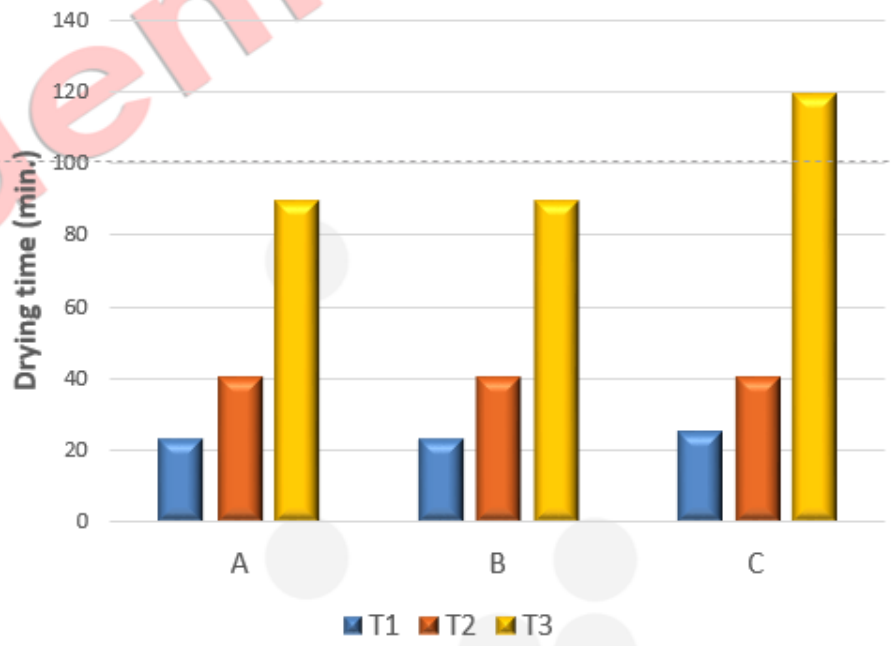
Cross-linkers for Wood Coatings

Reduce drying times due to IPDI derivatives, no negative impact due to PGDA solvent

Furniture varnish based on Setaqua™ 6522/6516



Parquet lacquer based on Alberdingk® U 9150

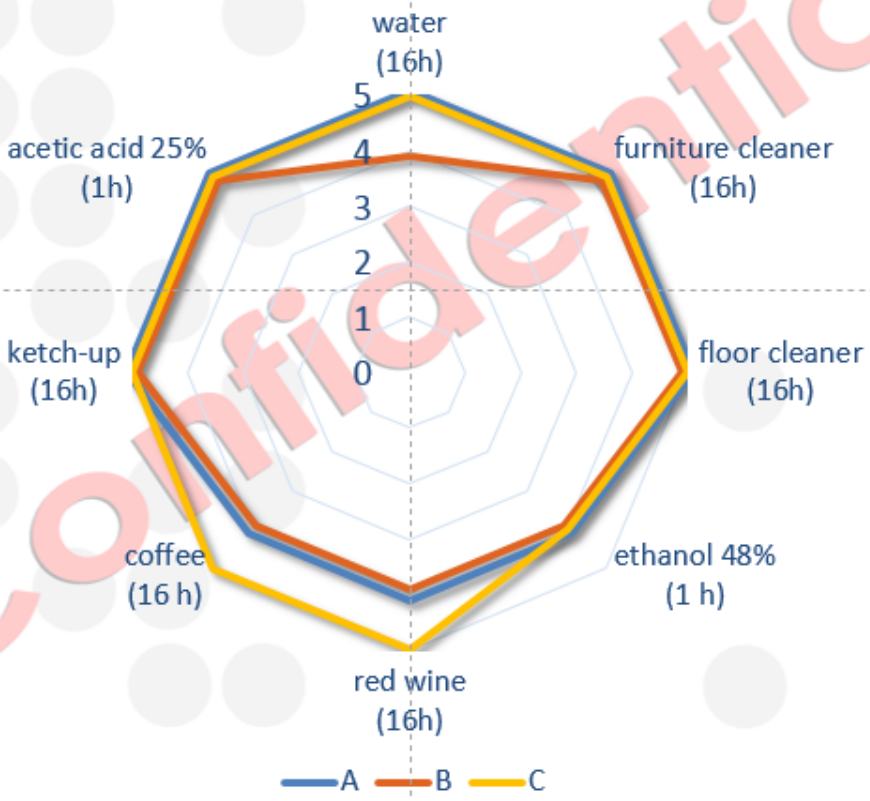


A: hybrid at 69% in PGDA
B: hybrid at 69% in Butoxyl
C: Std. HDI-trimer at 70% in PGDA

According to ISO 1517

Cross-linkers for Wood Coatings

… while preserving good chemical resistance



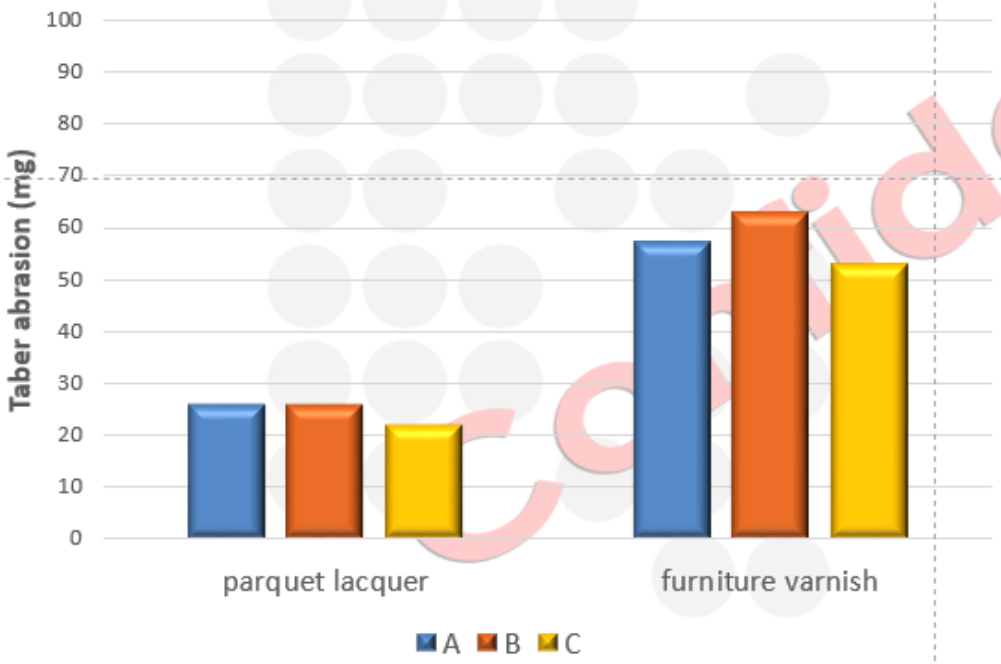
Formulation based on Setaqua™ 6522/6516, 200µm wet film on glass panels
According to EN 12720, 0 = bad, 5 = good

A: hybrid at 69% in PGDA
B: hybrid at 69% in Butoxyl
C: Std. HDI-trimer at 70% in PGDA

Cross-linkers for Wood Coatings

Excellent Taber abrasion and good stackability

Formulations based on Alberdingk® U 9150 (parquet lacquer), and Setaqua™ 6522/6516 (furniture varnish) (1 Kg, 1000 rotations, CS 10 wheels)



Formulation based on Setaqua™ 6522/6516, 100 µm wet on Leneta-card, curing at 50°C, Contact black on white1h, 50°C,150 g/cm²

Pass

Fail

Forced drying	A	B	C
30'	Pass	Pass	Fail
45'	Pass	Pass	Pass

A: hybrid at 69% in PGDA
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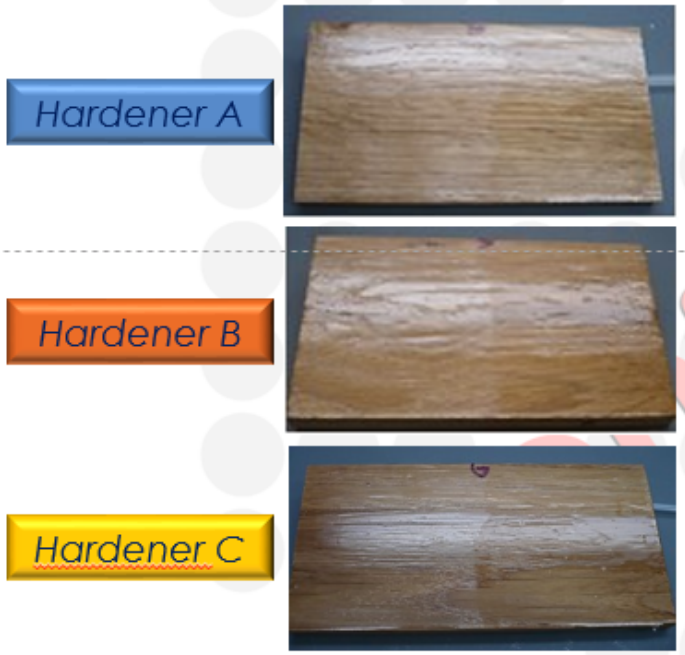
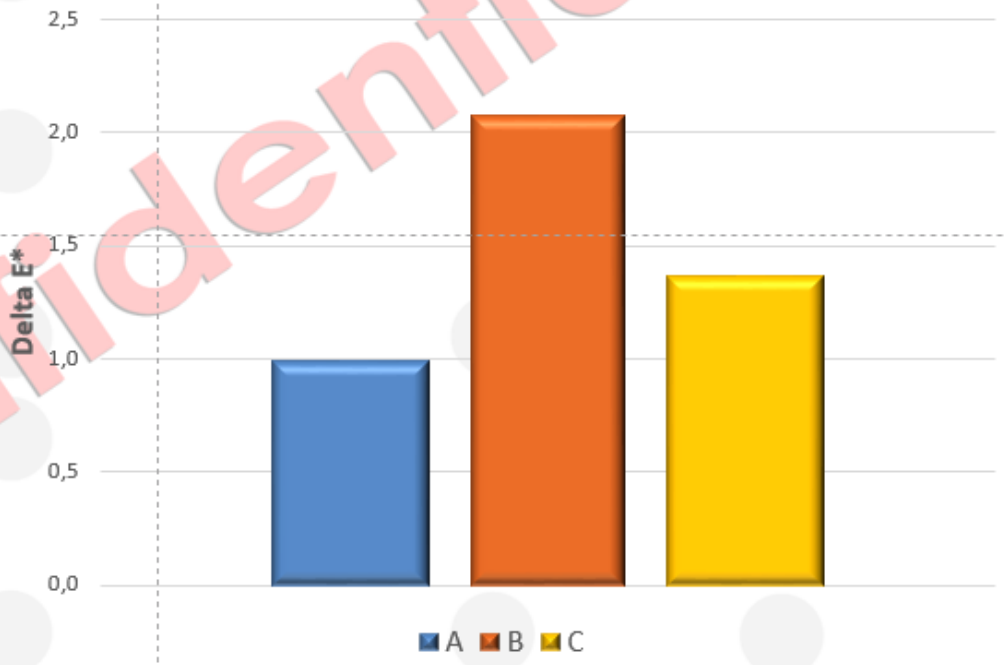
Cross-linkers for Wood Coatings

Wood warming « Anfeuerung »: improved by PGDA due to lesser difference compared to « wet look »





Formulation based on Alberdingk® U 9150, average on 5 panels

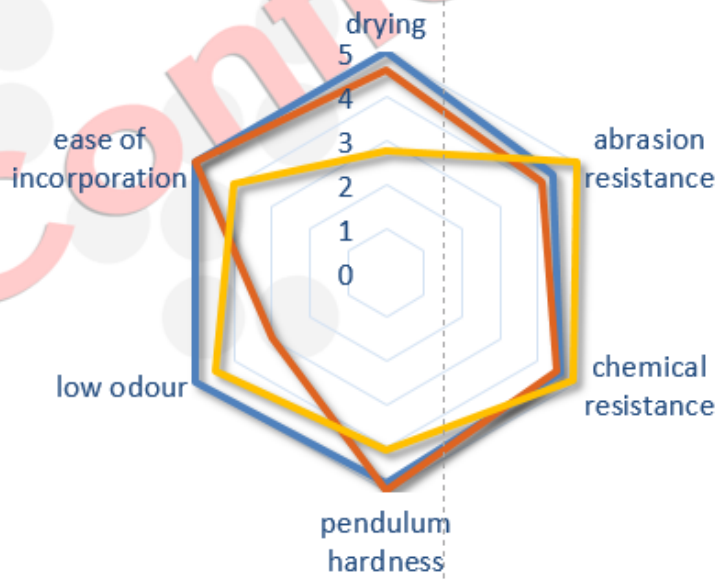
A: hybrid at 69% in PGDA
B: hybrid at 69% in Butoxyl
C: Std. HDI-trimer at 70% in PGDA

Cross-linkers for Wood Coatings

Equilibrated performance profile

Hardener A achieves through an optimized balance of HDI- and IPDI- derivatives in combination with an appropriate solvent:

- Excellent performance profile
- Making reduced hazardous indoor emissions possible
- Improving wood warming « Anfeuerung »
- Ready to use



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A: hybrid at 69% in PGDA
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C: Std. HDI-trimer at 70% in PGDA

Cross-linkers for Wood Coatings

Used hydrophilic hardeners:

	Hardener	Hardener type	Solvent	Solids	NCO
A	**Easaqua™ D 870 (Vencorex)**	Hydrophilic hybrid hardener based on HDI- and IPDI- derivatives	PGDA	69%	12,4% (supply form)
B	**Easaqua™ D 803 (Vencorex)**	Hydrophilic hybrid hardener, similar to A	Butoxyl	69%	12,2% (supply form)
C	**Easaqua™ M 502 (Vencorex)** diluted to 70% solids	Standard HDI-based hydrophilic hardener	PGDA	70%	18,3% (diluted)

Thank you